



The Natural and Artificial Lighting of Buildings

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IT is only by virtue of light, natural or artificial, that architecture exists at all, and the gradations of light, its colour and intensity, affect so profoundly our appreciation of beauty in mass and detail that the architect may be said, without unduly straining metaphor, to be primarily a craftsman who works in light and illumination as a material. One would therefore expect him to be an ardent student of illumination, and to devote more attention to its most perfect and powerful form of sunlight than to artificial light, and to study its more general form of diffused daylight even more than sunlight.

Actually, however, the subject of illumination, certainly of natural illumination, is I believe entirely absent from the curricula of architectural schools, whilst the knowledge and even the ideas of practising architects on the subject are often extremely hazy and meagre.

There is, I think, no exaggeration in suggesting that the average designer has but little exact information about sunlight, rather less about artificial illumination, and practically none about natural illumination apart from sun. This somewhat extraordinary state of things is chiefly due to the fact that the everyday phenomena of natural light are considered to be too well known and obvious to require attention scholastically. But we are generally most profoundly ignorant of those things which are open to our constant daily observation. What normal man could say at midday what his wife was wearing at breakfast on the same morning, or sketch from memory the figures on the dial of his own watch?

Familiarity is apt to breed a certain amount of indifference, and our powers of intelligent observation are always more or less dormant with regard to everyday matters.

Nothing could comply with that definition better than the waxing and waning of natural light and the apparent path of the sun across the heavens.

THE EYE AS A MEASURING INSTRUMENT OF NATURAL AND ARTIFICIAL LIGHT.

In addition to this potent reason for lack of definite information there are others which are less well known, in

fact almost completely unsuspected. Chief amongst these is the fact that our eyes, which we imagine, not without reason, to be capable of indicating varying intensities of illumination, become in the presence of natural light hopelessly and even ludicrously inaccurate as a measuring instrument of intensity, giving us precisely the same visual impression over ranges of variation which are not only large but huge.

Our eyes undoubtedly do so adapt themselves with marvellous automatic precision as to receive only quite a small amount of natural light, something not very much more than the natural illumination at very early dusk or late dawn.

Throughout the day the intensities of illumination available may be some hundreds and even thousands of times this amount; but our eyes automatically reject it, and accept from nature's bounty only that small amount which at other times may be all that is available. For this reason we can and do remain always absolutely unconscious of available intensities of huge amount. Between, say, an hour after sunrise and an hour before sunset there is no great apparent change in the available daylight, although any photographer's table of exposures shows how great the actual differences must be.

Inside any ordinary well-lit room the light seems to be practically the same from the window to the back wall and to be pretty much the same as it is out of doors. But look at the window from outside beside any light building front. All the windows (*i.e.*, the room interiors behind those windows) appear by contrast to be absolutely black. We know also by experience that upon any day when a photographic exposure of, say, one second would suffice out of doors, an exposure of perhaps five minutes might be required for a well-lit interior—a difference of 300 to 1.

Actually the light in any ordinary room lit by windows on one side drops some 90 per cent. or more between the window wall and the back wall. The fact that our eyes remain unconscious of any serious difference in such a

room is no proof that none exists. We simply cannot trust our eyes in this matter as in many others.

But this beautiful automatic adaptation of the eye does not take place to the same extent under the usual intensities of artificial light, which differs essentially in composition and colour from natural light. Whilst our eyes have developed under daylight for countless ages they have only been using artificial light for a paltry generation or two, and have apparently not learned to be tolerant of variations in it. They demand that artificial illuminants shall be adjusted to approximately that adequacy which they carve for themselves out of daylight, and they refuse to make the necessary adjustment themselves. Anything much brighter than this is painful and injurious to them, anything much less is injuriously inadequate. Such sensitiveness to the intensity of artificial light can be trained to considerable accuracy in estimating the intensity of *artificial* illumination, in spite of the well-known physiological fact that measurement by means of memory of general impressions is most unsatisfactory. Unfortunately this leads us to believe that similarly we can always measure by our visual impressions the intensity of daylight. We cannot do so at all without special arrangements, nor do so with even reasonable accuracy without special instruments. Until this fundamental fact is recognised we can neither make progress with our knowledge of the subject nor avoid unconscious perjury in ancient light cases.

THE DIFFERENCE BETWEEN NATURAL AND ARTIFICIAL LIGHT.

Light from the sun can reach us either in beams through clear air, from blue sky diffused by the earth's atmosphere, through clouds of varying thickness or density, and through the smoke belt of towns.

Its colour varies in each case. White light is a combination of all colours in the spectrum, each of which varies not only in wave length but also in intensity and in the vigour of its particular effect on the optic nerves.

Daylight may be considered as an orchestra of colours in which the various instruments differ in note, in loudness, and in timbre.

The combined note of the resulting harmony can be dominated more by the greens and yellows than by the softer and less insistent shades of purple and violet, just as the soft tones of the violins will be more or less overpowered by the brass instruments even when the latter are not played loudly. But the differences in colour and tone between, say, direct sunlight and light blue sky are very small as compared with the difference between even the best ordinary artificial illuminant and that form of daylight which it most resembles, such for instance as between a modern gasfilled electric lamp and sunlight.

DAYLIGHT LAMPS.

Various attempts have been made to rectify this difference in order to produce an artificial illuminant which shall have the same or nearly the same effect on our eyes as natural light. But even the most brief account of the vast amount of thought and research which have been directed to this end would form a long paper, and time does not permit more than a passing reference to a branch of science in which this country has played no small part.

Suffice it to say that up to the present the only reasonably practicable method of altering the light from artificial illuminants has been to extract from it, either by reflection from bluish surfaces or by absorption through bluish glass, those yellowish colour elements which are too insistent, in order that we may enjoy the violet end of the spectrum as well as the remainder.

The waste thereby occasioned is comparable with having to employ an entire orchestra and then forcing the brass instruments to sit silent in order that we may hear the strings.

The best daylight lamps thus waste some 60 per cent. to 70 per cent. of the light available from the bare lamp. Extravagant as this discount appears to be, it must be remembered that we often waste as much by badly designed shades and reflectors.

Daylight lamps are invaluable for many operations involving the judging or matching of colours, such as the examination of seeds, corn, tobacco, furs, etc., and the matching and examination of textiles. Their use might well be extended to Art Galleries. In the busy, prosperous, but smoky towns of the North one often finds priceless collections of art treasures housed in palatial galleries but only visible by daylight on rare occasions.

COLOUR IN LIGHT.

In all the fairyland of science there is perhaps no subject which can afford us so much sheer delight for so little labour as the study of coloured lights and the effect of tinted lights upon coloured surfaces.

The painters discovered this half a century ago, and were richly rewarded. Claude Monet's "Impressions," a sunset study in the Salon des Refusés of 1863, was probably one of the first attempts to depict colour in atmosphere by a technique dimly envisaged by Velasquez. Fortunately this picture excited that bracing stimulant to achievement, the contemptuous derision of the orthodox; and drew together in protest men like Edouard Manet, Monet, and particularly Delacroix, who cheerfully adopted the derisive appellation of "Impressionists," and founded a new cult.

These men were not content to note as curious but inexplicable phenomena such facts as a sawn-faced model casting a violet tinted shadow whilst the shadow of a red faced model was greenish, why bright green grass appeared to be blue from a distance, why the white snow caps of distant mountains changed to coppery red at sunset, and similar facts. They called science to their aid and studied with avidity the difference between mixing pigments and mixing lights. Why, for instance, a mixture of blue and yellow pigments produces green, whereas the mingling of blue and yellow light gives white. Why primary colours in pigments are not primary colours in light, and the like. Their researches revealed the fact that light reflected from a series of small coloured surfaces in close juxtaposition, i.e., the coloured *lights* from such surfaces, unconsciously mingled by the eye, afforded new, beautiful, and essentially natural results, often quite unexpected. The effect of mingling a stipple of blue dots amongst a stipple of red dots, for instance, produces a yellow instead of the black which results from mixing red and blue pigments.

They acquired thereby a new outlook, a new palette, and practically a new art; in which colour and atmosphere, instead of being merely suggested on the canvas, seems actually to live on it.

Probably no such triumph awaits the architect, but the episode is suggestively instructive; and the modern developments of colour photography and the perfection of coloured lamps open up a somewhat large field to the architect who does not think only in brick, stone, timber, and plaster, but regards landscape gardening and interior decoration, and even the colouring of exteriors, as part of his rightful heritage. He must bestir himself, however, and exert his ownership over those fields, or he may find his fee simple title encumbered with the squatters' rights of specialists.

But we must leave this entrancing theme, well worthy of a paper to itself, or we shall all be here till midnight. We can merely glance at the beautiful examples of three-colour printing and three-colour photography which have kindly been lent to illustrate this branch of the subject. They may perhaps serve to give you pleasure during the duller portions of this paper.

We have to concentrate upon these practical questions, occurring daily in practice, as to whether a given window in a given situation is large enough or too large; whether its dimensions must be varied in width or in height, and if so, to what extent, or whether an additional window is required.

Our knowledge of daylight has now advanced so far that it is possible to predetermine accurately from drawings alone to what extent any interior will be lit with any given system of fenestration and with any given degree of obstruction, and to say whether any portion of that interior will fall below the requirements of comfortable use.

ILLUMINATION.

In order to view objects satisfactorily it is not sufficient to have strong light sources in the vicinity—the light must reach the object. We must have illumination as well as light. But illumination alone is not sufficient.

We view objects not so much by the light which falls upon them as by the light which is reflected from them into our eyes; a beam of quite powerful light projected on to thick dull black cloth disappears almost completely. But reflective capacity is also insufficient without contrast. A thin glass tumbler or a thin sheet of celluloid immersed in a white china bowl full of water cannot be distinguished even under strong light.

Given any object such as a book or a sheet of paper with a reasonable coefficient of reflection, and viewed under circumstances which provide reasonable contrast, satisfactory lighting of an object depends upon—

(1) The illumination or flux of light falling on the object—which is measured in foot-candles or lumens per square foot; a foot-candle being the illumination received from one standard candle at a distance of one foot, and a lumen being the flux of light which will illuminate one square foot of surface to an intensity of one foot-candle.

(2) The ability of the object to reflect light back into our eyes, measured as "reflection coefficients," or the

proportion reflected of any light falling on the object. A table of some reflection coefficients is given in Appendix I.

HORIZONTAL AND VERTICAL ILLUMINATION.

But no flat surface reflects light equally in all directions. If the surface be smooth or polished it conforms to the laws of specular reflection. Under a beam of light striking it at a given angle with the plane of the surface it will appear to be most brightly illuminated in a direction 180° on plan from the incident beam of light and inclined at the same angle from the surface (Fig. 1) in accordance with the well-known rule of optics that the angle of incidence is equal to the angle of reflection. In other directions only such light is reflected by the surface as is due to inequalities of the smooth surface or divergence of the incident beam.

But paper, books, and the majority of objects which it is necessary to view have dull, unpolished, or "matt" surfaces; and reflection from such surfaces differs very materially indeed from specular reflection.

A true matt surface, to which white blotting paper approximates, follows the law discovered by Lambert in 1760.

Whatever may be the angle at which a beam of light strikes it, the maximum reflection from a truly matt surface will be in a direction normal to the surface and the reflection from it in every other direction will vary directly with the cosine of the angle which that direction makes with the normal to the surface.

The light reflected in all directions measured to scale will, therefore, be limited by a circle as in Fig. 2.

Conversely, light falling upon a matt surface at an angle is less efficient in producing illumination than light which falls in a direction normal to the surface, simply because the surface presented to the incident light, like the surface available for oblique reflection, grows less and less as the angle of incidence departs from the normal (Fig. 3).

From these considerations it will be seen that as books, paper, and most objects worked upon are generally viewed in a direction nearly vertical, it follows that light from high angles is more valuable than light from directions nearer to the horizon, whether the surface viewed be polished or matt. A skylight gives more working light than a window of the same glass area, and screening the top of a window darkens a room far more than the screening of an equal glass area at the bottom.

There are, of course, additional reasons for this. In towns the zenith sky is nearly always brighter than sky nearer to the horizon where the light from the sky has to pierce a greater thickness of smoke belt (Fig. 4).

Still more important is the fact that obstructing buildings almost invariably block out sky from low angles, and generally the only available sky is visible through the upper panes of glass. It will be shewn later that visible sky is the dominating factor in natural illumination.

For viewing objects in a horizontal direction, such as bookcases, pictures on walls, wall bins in stores, packing cases with labels on the sides, etc., horizontal illumination is, of course, more valuable than vertical, but in the sum total of ordinary human requirements these do not bulk largely.

POINT AND LUMINOUS SURFACE SOURCES OF LIGHT.

It is very necessary to appreciate that the laws of optics as usually stated in text books refer almost invariably to point sources of light, a condition which is seldom or never found in practice.

For example, the well-known law of inverse squares by which we know that the illumination from a point

from the window happens to decrease approximately in that proportion.

As both the width and the height of any sky visible decreases directly with the distance, the illumination due to the area of visible sky would vary inversely with the square of the distance, were it not for the fact that sky varies in its lighting capacity according to its angular

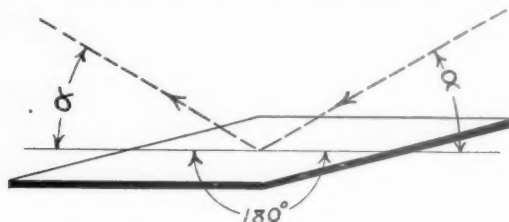


FIG. 1.—SPECULAR REFLECTION

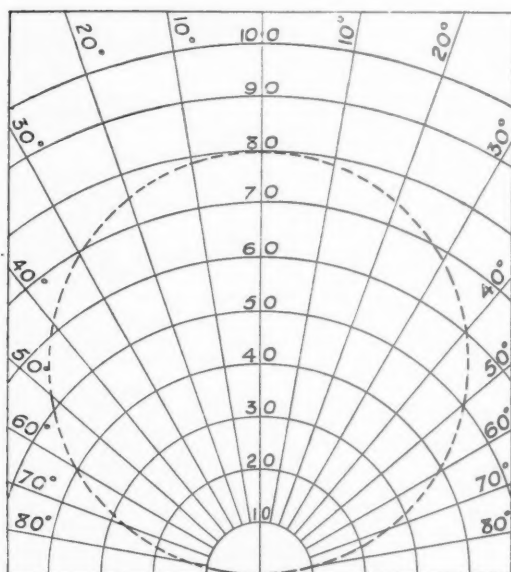


FIG. 2.—DIFFUSE REFLECTION FROM MATT SURFACE

source of light falls off inversely as the square of the distance from that point (Fig. 5) does not operate when the source of light is a surface, such as an area of sky, a light building front, or an illuminated wall or ceiling.

Curiously enough, the illumination from a window received from unobstructed sky directly visible from that window does fall off approximately in inverse proportion to the square of the distance from the glass, but that is merely because the area of sky visible as we go further

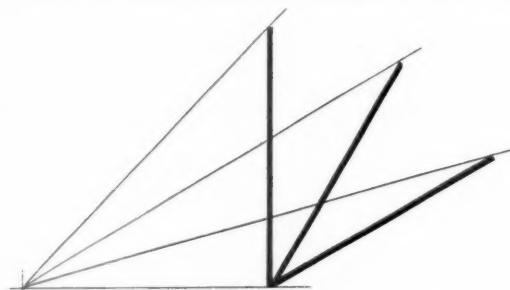


FIG. 3.—PROJECTED AREA OF REFLECTING SURFACE

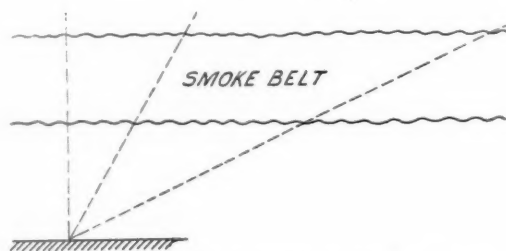


FIG. 4.—PENETRATION OF SMOKE OR CLOUD BELT BY SUNLIGHT

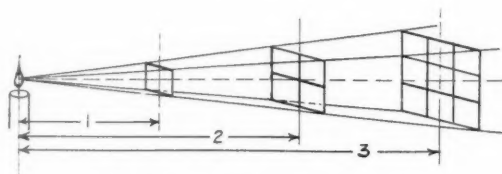


FIG. 5.—LAW OF INVERSE SQUARES

elevation above the horizon, high angle sky being the more valuable for vertical illumination on a horizontal plane, and low angle sky for horizontal illumination on a vertical plane.

When, however, the visible sky is obstructed by a building distant from the glass, as on the farther side of a road, this, of course, does not hold good. As we go farther back from the glass the angular elevation of the window head decreases more rapidly than the angular elevation of the obstruction (Fig. 6).

PHOTOMETERS.

It has been stated that the human eye is an extraordinarily inaccurate judge of daylight by general or memorised comparisons. Yet if daylight is to be measured it must be by the eye.

In the instruments known as photometers used for measuring illumination, whether natural or artificial, advantage is taken of the ability of the eye to distinguish

two well-known forms of portable illumination photometers are described and illustrated in Appendix II.

Photometric apparatus for measuring the candle power of lamps, analysing colour constituents, etc., are necessarily larger and more complicated, and being used mainly for laboratory work need not be described here. By any of the small portable photometers described, or even by means of a small photographers' exposure meter

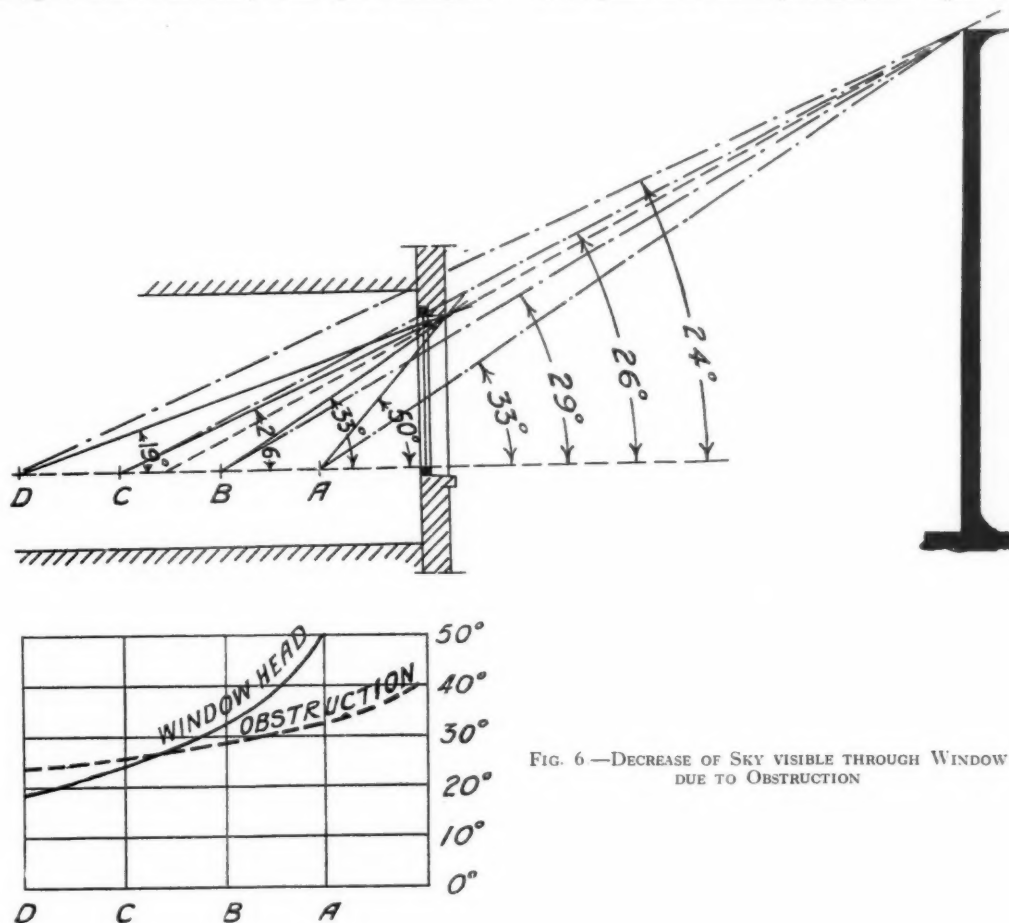


FIG. 6.—DECREASE OF SKY VISIBLE THROUGH WINDOW DUE TO OBSTRUCTION

quite a minute difference between the brightness of two small contiguous surfaces.

Practically all such instruments illuminate one of such two contiguous surfaces by means of a measured variable proportion of the light emitted by a small standard electric lamp, whilst the other surface receives the illumination to be judged by comparison.

Suitable means are adopted whereby the variation in the standard light is indicated in foot candles. One or

properly calibrated, an architect can measure and record or memorise degrees of illumination which he finds to be satisfactory or the reverse. Especially useful are they in drawing attention to the matters which prejudice our judgment.

It is, for example, extremely instructive to find that a room with a particularly tinted wall paper or furniture gives an impression of cheerful lightness which is absent in a similar room differently decorated or furnished, but possibly enjoying actually even more light.

It is undoubtedly the fact that we generally judge and value illumination, both natural and artificial, not so much by our ability to work under it as by the apparent brightness of those objects or surfaces which chiefly force themselves on our attention.

It is this psychological aspect of illumination which is, I suggest, the peculiar province of the architect. It is an intensely interesting subject, almost unexplored, but of the greatest importance. We may be able to measure the candle power of our lamps in all directions to small fractions; we can predetermine the illumination given by them on working planes with great accuracy; ophthalmic surgeons can tell us the upper and lower limits of suitable illumination for given conditions of working; but all this exact work, interesting and necessary as it is, will not answer the extremely important question as to whether the user is going to *feel* that he has a proper or even a comfortable light. That depends—at least until lengthened experience has corrected his views—very largely, in fact almost entirely, upon the surface brightness of prominent or arresting features of the room, and this is very largely in the hands of the architect.

The study and analysis of cheerfulness by the architect in the light of such knowledge and data as the illuminating engineer can supply would appear to be of first-class importance.

The writer therefore ventures to commend the more general study of illumination effects by means of these simple and handy little instruments.

No architectural school at least should be without one, and the means of keeping it correctly calibrated.

NATURAL ILLUMINATION.

Seasonal and Diurnal Variations.

Few people except expert photographers are aware of the enormous differences of daylight between dawn and sunset and between December and June.

Figs. 7 and 8 give the results of a series of measurements made in connection with the Home Office Inquiry into the Lighting of Factories.

The values given represent the apparent brightness of a white card lying horizontally on a flat, unobstructed roof and receiving all light from a complete hemisphere of sky. This is nearly the same as the average brightness of all parts of that hemisphere. It would be exactly the same if the card could reflect all incident light and absorbed none. The values are double what would be recorded on a card laid on an unobstructed window sill or stood vertically on a roof, under which circumstances it could, of course, receive light from only a quartersphere of sky. Further investigations were carried out daily last year at the National Physical Laboratory, Teddington, the observations being made in a fitting which restricted the light falling on the card to that from an octant of sky facing either N, S, E, or W. The average plotted curves for each month for each aspect, together with the figures for particular days representative of different kinds of weather, have kindly been supplied to the author by the Director.

The differences between aspects are very interesting, but they are, after all, only the average for one year, and

that a somewhat exceptional year, at Teddington, a semi-rural district, and necessarily differing materially from the light which was enjoyed over the same period in London, Leeds, Manchester, or any other of the crowded industrial districts where the perennial fight for light and air goes on under ever increasing disadvantages.

For comparison with the earlier records, Figs. 7 and 8, the author has added together the average light from all four octants and plotted them on Fig. 9.

The author has ventured to urge the authorities at Teddington to make some effort to obtain correlated observations at London, Manchester, etc., and to compare these with the records of the Meteorological Office of solar radiation, height and character of clouds, atmospheric pollution, etc.

If the latter records should, when properly applied, serve to account for the departures from a theoretical curve based on the sun's altitude, then light records could be built up for any place for which records exist, and averages could be struck for periods as lengthy as the records.

It is understood, however, that it may be necessary to wait until a few years' records had been collated at Teddington. The author has, therefore, attempted the investigation himself in the rare intervals of leisure afforded by a somewhat busy practice. It is not yet completed, but the result so far is hopeful.

The author desires to record his indebtedness to Dr. Chree, of Kew Observatory, the nearest Meteorological Office station to Teddington, who has afforded him every possible assistance in the compilation of data for this purpose.

PRINCIPLES OF MEASURING DAYLIGHT.

In spite of its huge variations the daylight illumination of any interior can be expressed in very simple terms.

A window, a skylight, or an opening can never do more than convey to an interior position a proportion, and only a very small proportion, of the outside light; so that out of doors there may be, not two or three times the indoor light, but two or three hundred times. Under certain circumstances it may be about a thousand times as much without our eyes being able to appreciate much difference. Most fortunately with a sky uniformly bright, this proportion—known as the daylight ratio or daylight factor—does not differ from sunrise to sunset or from June to December. If a given position enjoys a ratio of, say, 1 per cent. it will have 10 foot candles when the outside light is 1,000 foot candles. When the outside light is 100 only it will have 1 foot candle.

It is generally expressed as the ratio between the brightness of a white card laid on an unobstructed window sill (which is very nearly half the sky brightness) and the brightness of the same card placed at any interior position.

It can also be predetermined, in so far as it depends on light direct from the sky, by plotting upon a suitable diagram a simple geometrical projection of any sky visible from such an interior position.

The diagrams used are of the forms shown in Figs. 10, 11, 12, and 13. They indicate a flat projection of a quartersphere of sky divided horizontally and vertically into square degrees.

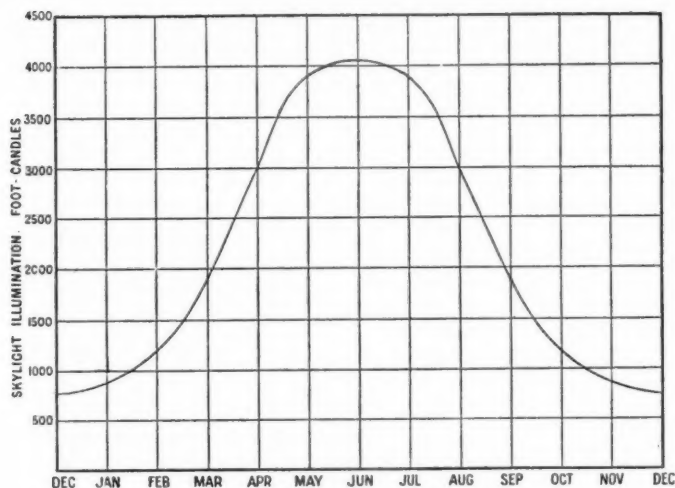


FIG. 7.—SEASONAL VARIATIONS OF NOON DAYLIGHT
Home Office Report on Factory Lighting, 1914

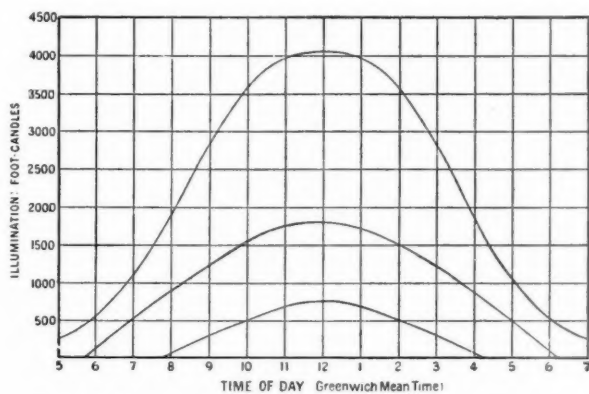


FIG. 8.—DIURNAL VARIATIONS OF DAYLIGHT, MIDSUMMER,
EQUINOXES, AND MIDWINTER
Home Office Report on Factory Lighting, 1914

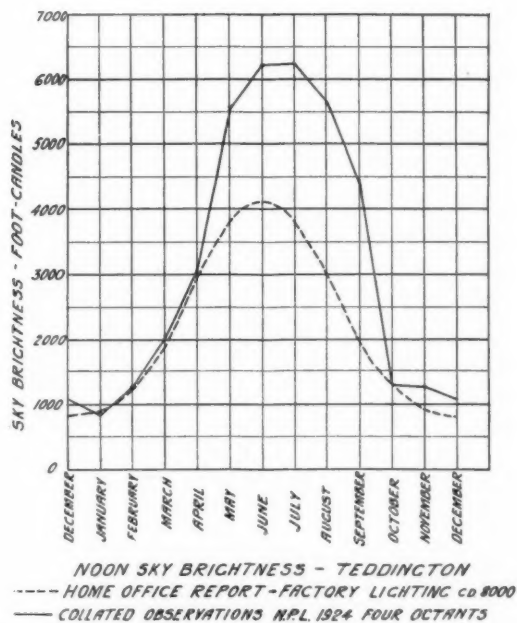


FIG. 9.—SEASONAL VARIATIONS OF NOON DAYLIGHT, TEDDINGTON, 1924

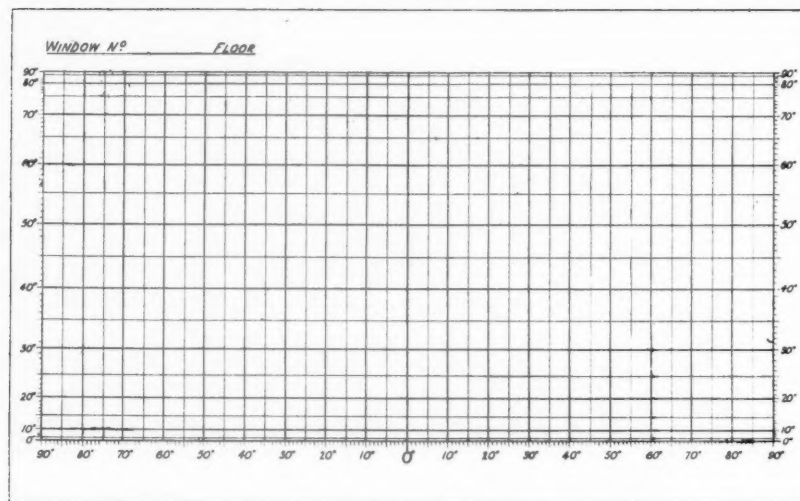


FIG. 10.—DIAGRAM FOR CALCULATING DAYLIGHT RATIOS. Illumination Measured Vertically on Horizontal Surfaces

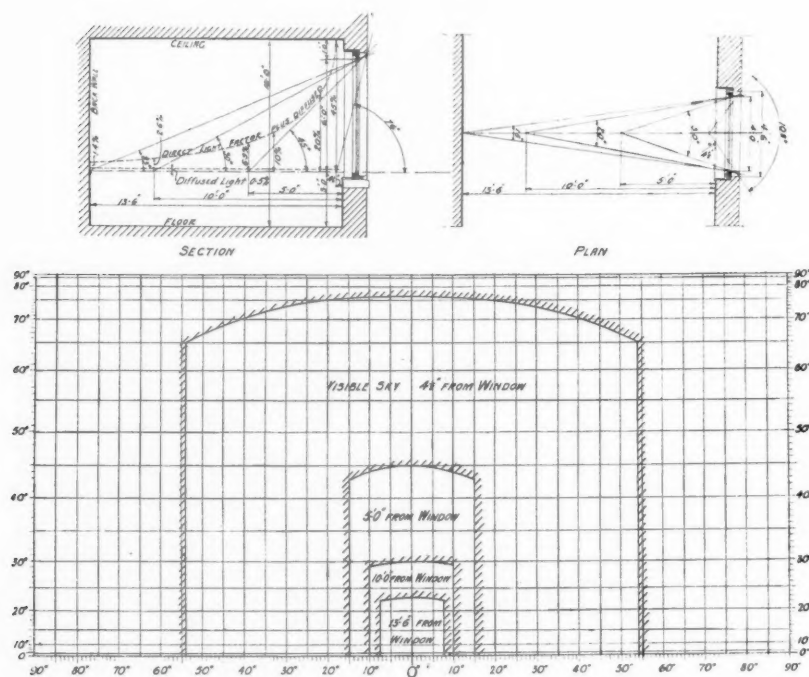


FIG. 11.—EXAMPLE OF USE OF DIAGRAM FOR CALCULATING DAYLIGHT RATIOS ON HORIZONTAL SURFACES

It will be noticed that the vertical divisions are not regular. That is because they have been adjusted geometrically to allow for the different lighting capacities of sky at different degrees of elevation. If the size of the diagram is, say, 20 inches by 10 inches = 200 square inches,

divisions are adjusted for illumination falling vertically on a horizontal surface such as a book or table. In Fig. 12 they are adjusted to illumination falling horizontally on a vertical surface such as a picture, a bookcase, or some forms of textile machinery. In Fig. 13, the angular divi-

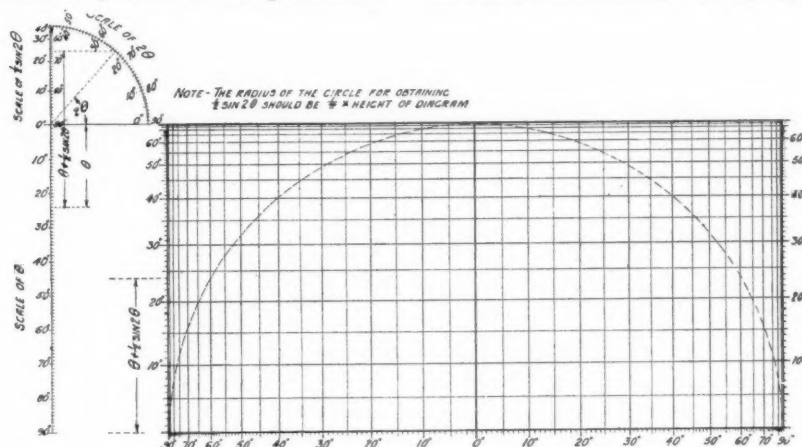


FIG. 12.—DIAGRAM FOR CALCULATING DAYLIGHT RATIOS
Illumination Measured Horizontally on Vertical Surfaces

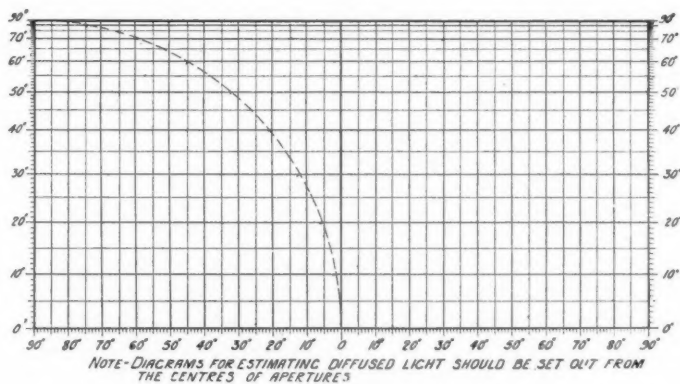


FIG. 13.—DIAGRAM FOR CALCULATING DAYLIGHT RATIOS DUE TO DIFFUSE
REFLECTION FROM WALLS AND CEILING

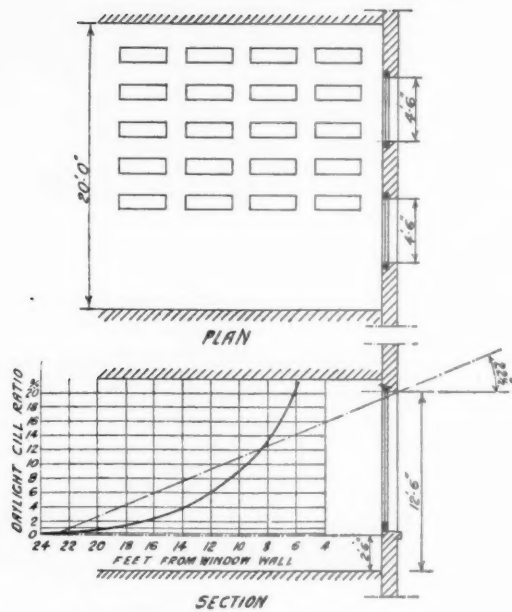
then every square inch of it, wherever situated, will represent $\frac{1}{4}$ per cent. of the lighting capacity of the complete quartersphere of sky.

If the sky area visible from an interior position through a window be projected on to such a diagram by means of its horizontal and vertical angular limits, then the area so projected measured in square inches represents exactly the daylight roof ratio at the point in question multiplied by four, or its daylight sill ratio multiplied by two. In the form of diagram shown in Figs. 10 and 11, the angular

sions are adjusted to give equal values for light diffusely reflected from walls, etc.

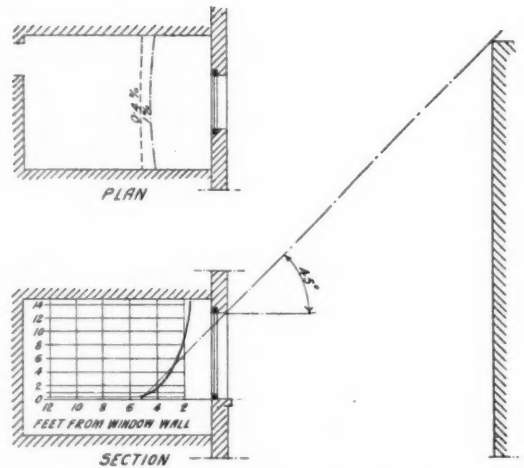
The simple methods of constructing these diagrams and the mathematical proof of their accuracy are described in a paper read by the author and his son at the Illuminating Engineering Society, April 1922, and now published by Messrs. Batsford.

In order to ascertain the distribution of light in an interior a number of suitable points are selected and the sky visible from such positions is projected and measured.



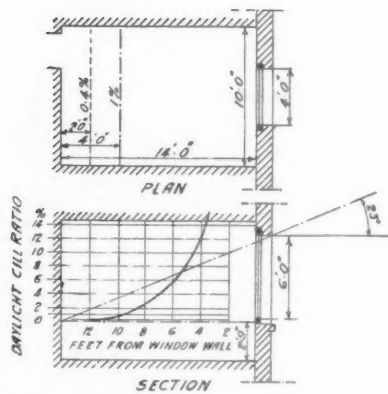
ELEMENTARY SCHOOL CLASS ROOM
OBSTRUCTION 80'0" DISTANT SUBTENDING 22 1/2° AT WINDOW HEAD

I



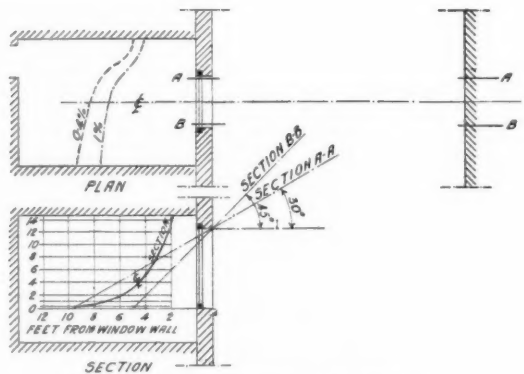
SINGLE WINDOW OFFICE 14'0" x 10'0"
OBSTRUCTION 20'0" DISTANT SUBTENDING 45° AT WINDOW HEAD

III



SINGLE WINDOW OFFICE 14'0" x 10'0"
OBSTRUCTION 40'0" DISTANT SUBTENDING 23° AT WINDOW HEAD

II



SINGLE WINDOW OFFICE 14'0" x 10'0"
OBSTRUCTION 20'0" DISTANT SUBTENDING 45° + 30° AT WINDOW HEAD

IV

FIG. 14.—DISTRIBUTION OF DAYLIGHT IN TYPICAL ROOMS

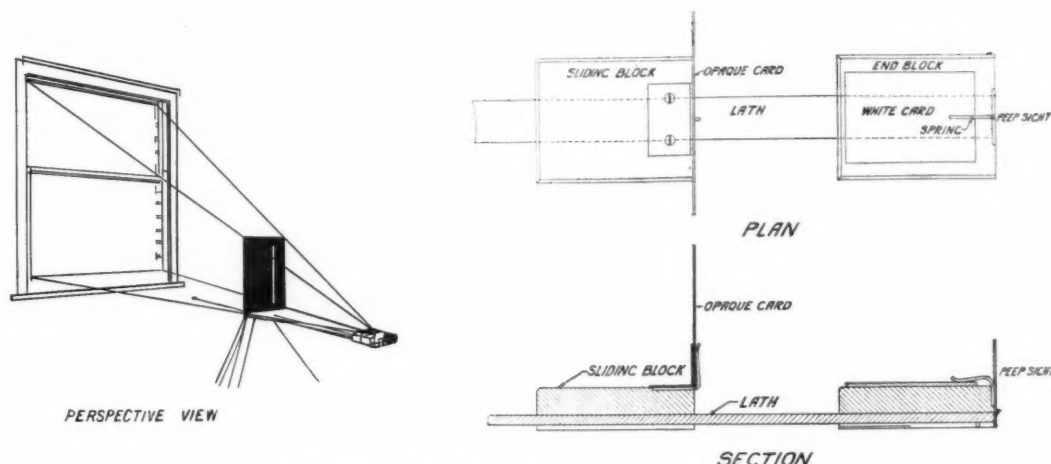


FIG. 15.—APPARATUS FOR MEASURING DIFFUSELY REFLECTED LIGHT

From these values "sections" of light can be plotted, and from these curves contour lines indicating any given limit of direct daylight ratio such as 0.4 per cent., 1 per cent., 5 per cent., etc., can readily be drawn.

Fig. 14 shows the typical light sections of:—

- (1) An elementary school class room,
- (2) An ordinary office adequately lit from the front nearly to the back,
- (3) The same obstructed to an angle of 45° from the window head,
- (4) The same obstructed partly to 60° and partly to 30° .

LIGHT DIFFUSELY REFLECTED.

In addition to light directly received from visible sky, which can readily be computed, there remains the light which is received by diffuse reflection from:—

(a) The walls, ceilings, furniture, etc., of interiors, part of which is received from a first reflection and part after single or multiple counter reflections.

(b) Building fronts, part of which is light received by such fronts direct from the sky, and part by reflection from other fronts. The latter is more obvious in a light well.

Excessive value is often attributed to the amount of useful light obtained by diffuse reflection. Light coloured surfaces, whether inside or outside, undoubtedly add very materially to the cheerfulness of an interior position. They also add something to its useful light, viz., the light which determines lighting up time and the ability to see and work on dull days, and are of value to positions which have nothing to spare.

But their value as a source of useful light is very small, decidedly less than that of even a small patch of visible sky, and is generally much over-rated.

They often serve to make people believe that the light is good, so that it is for example difficult to believe, at least on a sunny day, that in a small kitchen with a light coloured varnished paper, a clean white ceiling and a

large window obstructed by a white freshly stuccoed wall is not a well lit room. It requires experience at sunset and on dull wet days to show that the absence of visible sky cannot be compensated by bright surfaces.

Light received by diffuse reflection from interior walls and ceilings can readily be measured by the simple apparatus shown in Fig. 15.

The direct light from the window being shut off, that which remains on the card must be the total of the light received from interior diffuse reflection.

This has been measured in a number of cases both by the author and the N.P.L., and Fig. 11 shows what a small addition it makes to the total light.

But we must not despise small things merely because they are small.

Situations which enjoy no direct sky at all—and there are hundreds, perhaps thousands, of people condemned to work in such places in every crowded town—can be either intensely gloomy and depressing or they can be cheerful and at least apparently bright. It is the architect who can make the difference by careful and intelligent study of reflection coefficients, of apparent brightness, and of beneficial or deleterious contrast, aided by his invaluable training in general effects which are pleasing or the reverse.

REFLECTION FROM BUILDING FRONTS AND LIGHT WELLS.

As regards reflection from building fronts, it will be obvious that any white unobstructed vertical surface can never be more than half as bright as a white unobstructed horizontal surface, because the latter receives light from a full hemisphere of sky, whilst the former can only see a quartersphere. They may appear to be almost equally bright, but the loss is there.

But a vertical wall could only be half as bright as any sky it displaces if it reflected all incident light and absorbed none, i.e., if its coefficient of reflection were 100 per cent.

But even new clean white glazed bricks or new white-

wash can reflect only some 60 per cent. to 70 per cent., so that they would only be about one-third as bright as displaced sky if unobstructed.

They never are unobstructed, however, especially in the most valuable direction at right angles to the surface, near the horizon; and when we consider the amount of sky cut off from any reflecting wall surface by, say, the opposite side of a street, or the walls of a light well, it will be obvious that the 30 per cent. or thereabouts of an unobstructed vertical new white glazed brick or white-

tained by setting up sky projections from a sufficient number of points—treating the light well or the roadway as a room stood up on end—with one side, in the case of a light well, completely open as Fig. 16.

Values corresponding precisely to the daylight roof ratio of a horizontal room could thus be attributed to every course of bricks if necessary round the light well.

These, multiplied by the reflection coefficient of the wall surface, will obviously give the varying brightness of the light well walls at different heights as a proportion of the sky brightness. As the reflection coefficient can only be an average between cleaning periods, during which it may easily vary by 30 per cent. or 40 per cent. or more according to the weather, it is obviously rather a work of supererogation to trouble about the small addition afforded by diffuse reflection from side to side of the light well. But if desired an addition of, say, 5 per cent. may be made for this.

The amount of light obtained at any interior position condemned to see nothing but the inspiring prospect of a blank wall instead of sky can by this means be ascertained if necessary with very fair accuracy.

SUNLIGHT.

Considerations of space and time prevent the discussion of the highly interesting subject of sunlight and aspect, which is, therefore, relegated to Appendix III. This will be found on examination to be far more simple than it appears to be.

DETERMINATION OF PRACTICAL PROBLEMS IN NATURAL ILLUMINATION.

The first consideration in determining all practical questions in daylight illumination is the amount of light which reasonable people require for various purposes.

It will have been obvious from Figs. 7 and 8 that Nature provides for long periods quantities of light very considerably in excess of that which is available at times when most people would consider the light out of doors to be quite good.

Obviously, therefore, the proportion of the light outside which must be admitted by windows or skylights must be determined with regard to dull days in winter rather than bright clear days, and with regard to the times near sunset rather than middle day.

It is, therefore, necessary to fix upon a value of sky brightness which shall fairly represent moderately dull but not abnormally dull weather, when reasonable people would reasonably expect enough light indoors for ordinary purposes.

From the meagre official information available the writer has for some years adopted, *faute de mieux*, the reading of 600 foot candles to represent this sky brightness, equivalent to a reading of 500 foot candles on an unobstructed horizontal white card having a reflection coefficient of 83 per cent., or a reading of 250 foot candles on the same card standing vertically or observed on an unobstructed window sill.

This represents approximately the sky brightness on an ordinary wet day in spring and autumn in the country, and in the summer in towns, and in the country at about an hour, and in towns about 1½ hours, after sunrise and

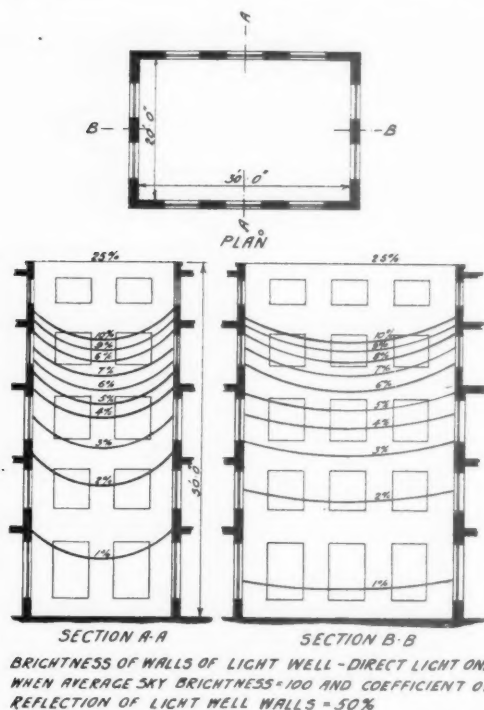


FIG. 16.—APPARENT BRIGHTNESS OF WALLS OF LIGHT WELL

washed wall can seldom average much more than about 10 per cent., and this rapidly deteriorates unless the bricks are periodically cleaned or the whitewash periodically renewed.

In addition there is, of course, light received by the wall from other building fronts, as in a glazed light well, but our knowledge of the relative values of direct and diffused light in rooms shows that this factor must be extremely small.

For all practical purposes a window looking out on to the walls of a light well or across a road on to a building front is looking out on to an artificial sky which will always be much less bright than the actual sky at any given time.

Its brightness relative to the actual sky can be ascer-

before sunset on fine days. It is rarely exceeded throughout the day in winter in towns except on quite fine days. The more exact data which we hope for may, of course, alter this very important standard.

The amount of illumination in foot candles recommended by various authorities for artificial light varies considerably. Making due allowance for the fact that some self-constituted authorities are financially benefited by high degrees of illumination, and that absolute perfection is not always economically possible, the values recommended by the last report of the Home Office Committee on Factory Lighting may be taken.

They are 3 foot candles for fine work and 5 for very fine work.

The author's experience is that most people require rather more artificial light for any given purpose than

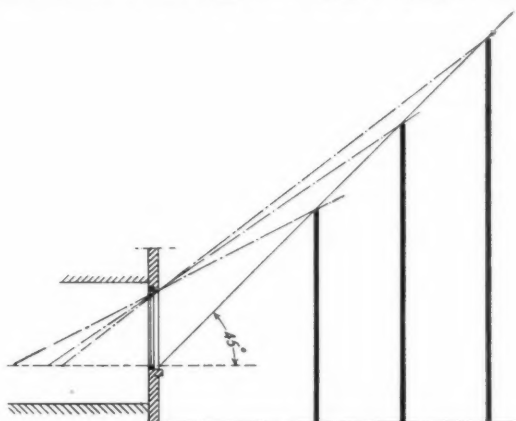


FIG. 17.—VARYING EFFECT ON LIGHTING OF INTERIORS BY WINDOW OBSTRUCTIONS SUBTENDING 45° AT SILL

the amount of natural light which will satisfy them, at least in the failing light of dusk.

Taking 1 foot candle of daylight as the average minimum requirement of adults for clerical work and for ordinary purposes and $2\frac{1}{2}$ foot candles for fine work or the eyes of very young children in schools, it follows that adequate light requires a minimum daylight sill ratio of 0.4 per cent. and good light a minimum daylight sill ratio of 1 per cent.

This assumption, which the author has invariably applied in ancient light disputes for many years, received a valuable and welcome confirmation when the actual conditions existing in new public elementary school rooms built to the structural rules of the Board of Education were reduced to terms of sill ratio in 1913, by a Committee of Medical Officers, Scientists, and Illuminating Engineers appointed by the Illuminating Engineering Society.

The sill ratio of the worst lit desk in new class rooms in this country was found by measurement to be 1 per cent., whilst precisely the same value was found to be involved by the recommendations or regulations of school authorities on the Continent and in America, all

of which, like the British structural rules, had been arrived at by the evolution of gradual trial and error.

The value of 0.4 per cent. sill ratio is also in accordance with the rough rule often adopted in ancient light cases to the effect that any point in an interior from which all sky is cut off at table height is necessarily inadequately lit.

All such positions must depend wholly upon light diffusely reflected from walls, ceilings, or building fronts, and numerous tests show that this seldom exceeds 0.2 per cent., even with moderate degrees of obstruction.

THE 45° RULE IN ANCIENT LIGHT CASES.

The well-known so-called " 45° rule" in ancient light cases is fallacious except in what the author believes to be its original form, viz., 45° to the sill of the lowest window in order to ensure less than 45° to the head of that window (the head and not the sill being the really essential point as regards loss of sky), and of course still less to the window heads of upper floors.

Misapplied as a criterion of obstruction to any window, 45° from the sill can cover, as shown in Fig. 17, quite a number of totally different degrees of real sky obstruction according to the height of the window head and/or the distance of the obstruction.

LATERAL AND DIRECT LIGHT.

Many architects draw a distinction between lateral and direct light. There can be none, for all light is more or less lateral. The only "direct light" or light at right angles to window glass which can reach an interior position is a beam of no width and therefore of no area. In so far as it can reach into a room even severely lateral light is as useful as light from any other direction. For this reason all the horizontal angles in the diagrams Figs. 10 and 13 are given equal values.

USE OF CALCULATING DIAGRAM.

The application of all these considerations to the problem of proper fenestration involves a certain amount of trial and error, but it is not necessary for the designer to set up innumerable diagrams, or to contour the plans of all rooms.

Given any desired system of fenestration and window head height, a typical position of worst lighting can generally be located readily by inspection.

If there be no obstruction, then one diagram set up from table height on tracing paper over a 20 in. \times 10 in. diagram, Fig. 10, will show at once by the fact of the visible sky measuring more or less than 1 square inch on the diagram whether the worst lit position has a sill ratio of more or less than 0.5 per cent., by no means a terrible operation. If the window is obstructed, then a line on section joining the top of the lowest obstruction to visible sky to the top of the glass and continued down to table height shows how far forward in the room the "no sky" position will extend.

The "grumble point" of 0.4 per cent. will be in front of this by a short distance which depends upon the width of the glass and the nature of the obstruction.

In the country people expect adequate light right to the back of a room. In towns they are satisfied with adequate light to all reasonable working positions. For this reason in towns a small office room adequately lit for

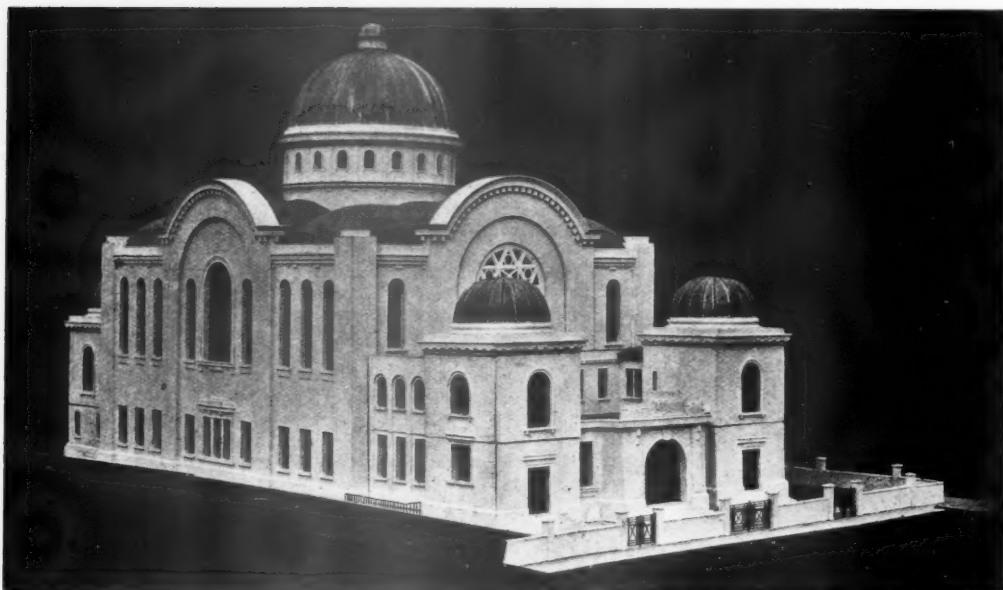


FIG. 18.—PHOTOGRAPH OF THE MODEL OF THE EXTERIOR OF WITHRINGTON SYNAGOGUE, MANCHESTER, AS DESIGNED BY MR. DELISSA JOSEPH, F.R.I.B.A. (COPYRIGHT RESERVED)

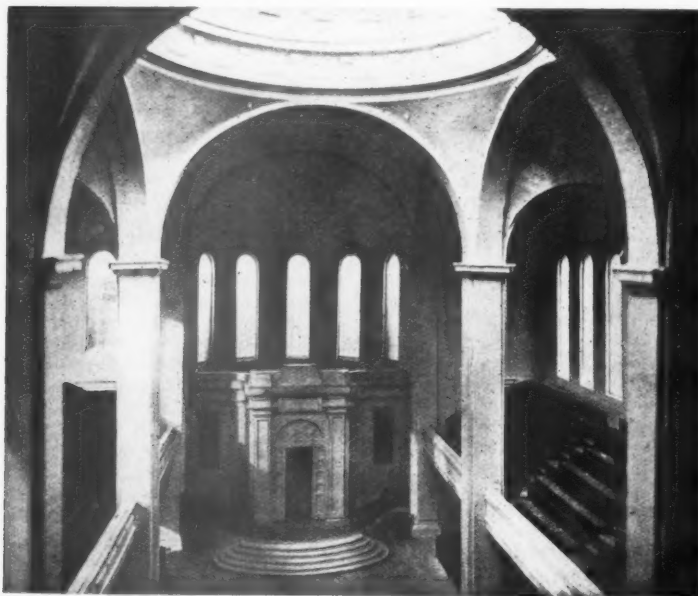


FIG. 19.—PHOTOGRAPH OF THE INTERIOR OF THE MODEL OF WITHRINGTON SYNAGOGUE, MANCHESTER, AS DESIGNED BY MR. DELISSA JOSEPH, F.R.I.B.A. (COPYRIGHT RESERVED)

only half its depth will satisfy many people. Large rooms or rooms with working positions farther back require deeper lighting.

It must always be borne in mind that any hard contrast between dark and light portions of the same room not only gives an impression of bad lighting, but is actually bad; because the eye unconsciously adapts itself to the brightest object in its field of view, and according to the extent to which it is thus "light adapted" to a patch of visible sky or a well lit table under a window, it is less able to see properly in darker parts.

For this reason top lighting by small skylights, which are apt to give very hard contrasts, is seldom satisfactory; and severe cases of obstruction to side windows which leave only a small well-lit patch under the window cannot be considered as merely cases of restricted working space. Sometimes it will be found that a small modification of the fenestration will effect a vast improvement. The kitchen of many a semi-detached suburban villa could be saved by a small window across the angle of the wall.

Unnecessarily low window heads are the most frequent cause of bad lighting, but sometimes even a window bulkheaded up into the floor above will be insufficient to give visible sky to important positions.

Faced with this difficulty the only thing is to make the best of a situation in which adequate lighting is impossible.

Reflecting mirrors or preferably prism glass catching beams of light from directions too vertical to get into the room are useful *so long as they are kept clean*; but the direction of such deflected light is unnatural and the inevitable glitter of specular reflection is bad.

Beyond this all that the architect can do is to provide light-reflecting surfaces inside and outside and to impress on his client the importance of frequent cleaning or renewal, and above all the very frequent cleaning of window glass. In towns a loss of light of 10 per cent. to 15 per cent. per month due to uncleaned glass alone is quite a moderate estimate. In winter it may amount to 10 per cent. in a week in towns, and in foggy weather even more. Where light is scanty and precious this is no small item.

THE USE OF MODELS IN PREDETERMINING NATURAL LIGHTING.

The investigation of positions in an interior and the drawing of contour lines on a plan, although more or less essential to prove evidence in ancient light cases, is a tedious and not very satisfactory method of visualising the general effect of any system of fenestration for a large interior.

The use of scale models, first suggested by Prof. Rudzicka in 1910, was long advocated by the author, and in 1912 with the invaluable aid of Prof. Clinton he was able, by means of an exhaustive series of experiments at University College, to establish the truth of the proposition that the natural light inside accurate scale models was identical with the light in the full size rooms which they represented.

The large daylight building at Teddington was designed primarily to receive large scale models of rooms, picture galleries, etc., for investigation.

The interior of scale models can with due precautions readily be photographed. By the courtesy of Mr. Delissa

Joseph the author is permitted to illustrate the photograph of the exterior and interior of a scale model by Mr. Thorpe of a large synagogue (Figs. 18 and 19).

The interior photograph was actually taken with a portion of the dome removed to compensate for the fact of the photograph being taken indoors, so that it is not necessarily an accurate test of the lighting provided by the design.

It serves, however, to illustrate the strikingly lifelike results which can be obtained merely by projecting a camera through a window or preferably a prepared aperture in the wall of a model.

PICTURE GALLERY LIGHTING.

The subject of lighting picture galleries has been treated somewhat exhaustively in the Transactions of this Institute.

The simultaneous tasks of avoiding glare and reflections from ceiling or side lights at high angles, and from spectators at low angles involve problems which can readily be solved by the methods described in this paper. High angle reflections can be avoided by keeping the picture glass outside the optical limits of specular reflection from high lights. Low angle reflections can be minimised by insuring that the lighting value of sky subtended at spectators (*i.e.*, its area when projected on to one of the diagrams described herein) shall be as small as possible as compared with that of sky subtended at the picture glass.

The foregoing is merely a cursory résumé of the work which has been done of late years to add to our stock of knowledge of daylight and its measurement. It is a subject which has been most unduly neglected, but which should be full of interest to the architect.

This country has nothing to be ashamed of as regards its contributions to what may be called the exact physical and physiological data. It remains for British architects to supplement its even more important psychological aspect.

ARTIFICIAL LIGHTING.

We can now turn with some relief from the perplexing variations and contradictions and the unexpected prejudices which make the subject of daylight so difficult to the more sober subject of artificial lighting, which in its modern forms is practically free from changes and fluctuations and is amenable to far simpler rules.

You will doubtless be relieved to learn that its treatment will be brief.

First it is necessary to draw a sharp distinction between the measurement of light sources in standard candles and the measurement in foot candles or lumens per square foot of the illumination afforded by such light sources.

The first is a fixed quantity, the second varies with direction and distance.

A foot candle being the illumination received by a surface every part of which is distant 1 foot from a point light source which in all material directions is equal to that of 1 standard candle, the surface in question must be part of the interior of a sphere of 1 foot radius. The light of 1 candle at the centre of a sphere of twice that radius would, therefore, be spread over four times the area. Its illuminating capacity would, in consequence,

be reduced to one fourth, *i.e.*, illumination varies inversely as the square of the distance.

This well-known law of inverse squares is only approximately correct for luminous surfaces such as gas mantles, translucent globes, etc.

In addition to this difficulty all known light sources

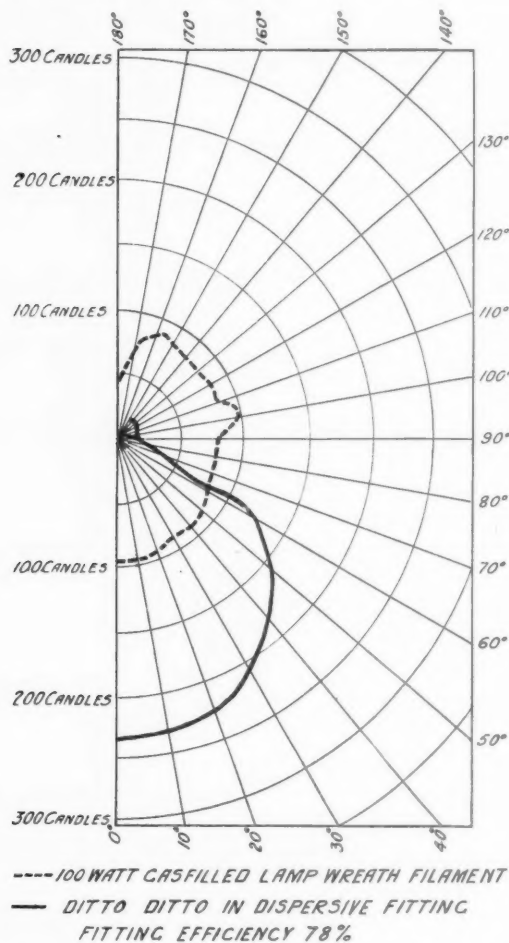


FIG. 20.—POLAR CURVES OF ELECTRIC GAS-FILLED LAMP, BARE AND IN FITTING

emit light unevenly. Fig. 20 shows the polar curve of the light emitted by a gas-filled lamp in vertical section and of the same lamp in the fitting indicated. Fig. 21 shows similar polar curves defining the light from a triple bare gas mantle and the same in the fittings indicated.

The term candle power applied to any lamp has obviously no meaning unless the direction of that candle

power is specified. From the polar curve of any lamp it is possible to calculate the mean candle power of the upper or lower half of a sphere surrounding the lamp known as the mean upper or lower hemispherical candle power (M.h.c.p.), or the average candle power all round known as the mean spherical candle power (M.s.c.p.).

But illumination is most conveniently expressed in lumens per square foot, one lumen being the light source which is sufficient to illuminate one square foot to an intensity of one foot candle.

A light source averaging one candle-power in all directions would be capable of so illuminating the area of a sphere of 1 foot radius or 4π square feet area. It therefore emits to 12.57 lumens.

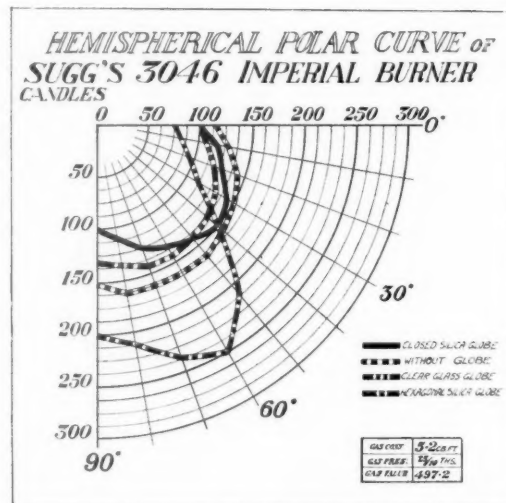


FIG. 21.—POLAR CURVES OF INCANDESCENT GAS MANTLES, BARE AND IN FITTINGS

The usefulness of this conception of light flux will be seen later.

Direction is not only important with regard to the variations of candle-power in various directions shown by the polar curves of light sources.

Suppose the illumination to be provided by 3 foot candles on a horizontal plane at table height and that a light source were available 6 ft. above and 6 ft. away from the centre of the table.

Light would therefore fall on the table at an angle of 45° . If the polar curve of the source indicated a candle power of, say, 216 candles at 45° , the gross illumination would be 216 candles divided by the square of the slant distance, or $\frac{216}{(6 \times \sqrt{2})^2} = 3$ foot candles approximately.

But the net or useful illumination must be reduced by the operation of Lambert's Law that illumination varies with the cosine of the angle of incidence. In this case the cosine of 45° is 0.707, so that the 3 foot candles becomes only $3 \div 0.707$, or, say, 2.1 foot candles.

As against this a certain amount of light would be obtained from directions of emission other than 45° by reflection from the walls and ceiling of the room and depending upon the proportions of the room and the coefficients of reflection of those walls and ceiling.

Then, again, allowance must be made for depreciation in the lamp and accumulation of dust on shades and fitting.

It will be seen that even when considering one point only in the middle of only one table things have by this time become, to say the least, a little intricate, and the prospect of specifying the lighting units of even one room, even if we have the polar curves of all available lamp shades and fittings, is somewhat terrifying. But lighting engineers have reduced their work, at least for ordinary interiors, to reasonable limits; not by careless or approximate short cuts, but by standardising and tabulating the effect of all essential factors to obtain what is known as the "utilisation factor" of any given fitting—i.e., the ratio between the number of lumens which a lamp is capable of emitting and the number of lumens which, when placed in that fitting, and under given conditions, it will afford to a given position.

For electric lighting units the tabulation of utilisation factors has been brought to a high pitch of perfection.

Tables are in existence giving the utilisation factors for all ordinary forms of lamps, reflectors and shades in connection with what are known as "room factors," which vary with the proportions of any interior and the mounting height of lamps above the plane of work, and the reflection coefficients of walls and ceilings.

In addition the mounting heights and spacings which will give satisfactory results as regards diversity of lighting for any given form of shade and reflector have been ascertained and exist in tabular form together with tabulated data as to the relative advantages of each form of fitting as regards efficiency for horizontal or vertical illumination, general appearance of a lighted interior, direct glare, reflected glare, shadows, and maintenance.

The task of the illuminating engineer is with this assistance, and as regards ordinary installations, quite simple.

The first task is to decide whether the situation demands that the light from the bare lamp shall be wholly reflected on to the work as with the ordinary enamelled iron reflector (direct lighting), whether some of it shall be allowed to escape upwards as with the ordinary opal glass shade (semi-direct lighting), whether it shall be wholly reflected upwards and be received by diffuse reflection from a white ceiling as with some forms of opaque reflector (totally indirect lighting), or whether it shall be mainly directed upwards for the same purpose by a reflector of opal glass or of some similar translucent material which allows part to escape downwards (semi-indirect lighting).

This being determined, the price and relative advantages of various types of fittings are studied with regard to the particular circumstances of the case.

In some instances economy in first cost must be sacrificed to secure low running costs or *vice versa*. In others appearance is all important, and in situations where cleaning is difficult, a low maintenance cost, i.e., easy cleaning, may be the first consideration.

Characteristics which are in some cases essential become in others merely desirable.

The type of fitting being selected, a suitable mounting height is determined and from this a trial spacing is set out. If the resulting lay-out is unsatisfactory the mounting height, or even the type of fitting, is varied until a suitable spacing can be properly combined with its appropriate mounting height.

The total floor area divided by the number of lighting points multiplied by the required illumination in foot candles gives at once the net number of lumens required from each lighting point.

The room factor for an interior of given dimensions and mounting height is obtained direct from a table, and reference to a further table gives the utilisation factor appropriate to this particular type of fitting, room factor, and coefficient of reflection of walls and ceilings.

The lumens required divided by this utilisation factor gives the number of lumens required from the bare lamp. An appropriate percentage having been added for lamp depreciation and dirt accumulation, a size of lamp is selected which emits as nearly as possible the requisite number of lumens.

Lighting units in gas or other illuminants do not lend themselves quite so readily to standardisation, but the pressure of competition is enforcing the use of similar data.

Simple though this method is in principle, it leaves scope for considerable exercise of trained judgment and experience, and where the size or importance of an installation justifies such a course, the employment of an expert should constitute a profitable investment.

FLOOD LIGHTING.

The limits of my space, and doubtless of your patience, preclude any treatment of this new and in many ways beautiful method of lighting; which, like many of the latest developments of shop lighting and particularly of shop window lighting, is of no small interest to architects.

The automatic operating mechanism of flashing signs also is very ingenious, but—to the writer—the only point of interest about it is the ease with which it can be put out of order with an ordinary hatchet.

APPENDIX I.

Approximate coefficients of reflection from matt surfaces of different colours:—

	Per cent.		Per cent.
White ..	84	GREENS.	
		Light satin green ..	63
		Light sage green ..	38 to 43
		Olive	21
		Forest	16
		Dark	10 to 20
		BLUES.	
GREYS	Per cent.	Light azure blue ..	52
Light pearl grey ..	73	Azure	39
Light grey	70	Sky blue	36
Silver grey	51	Dark blue	10 to 20
French grey	40		
Battleship grey ..	20	BROWNS.	
YELLOWS.		Light buff	60
Ivory white	77	Buff stone	47
Primrose	70	Tan	28
Caen stone	68	Cocoonut brown ..	16
Ivory tan	56	REDS.	
		Shell pink	51
		Pink	50
		Cardinal red	16

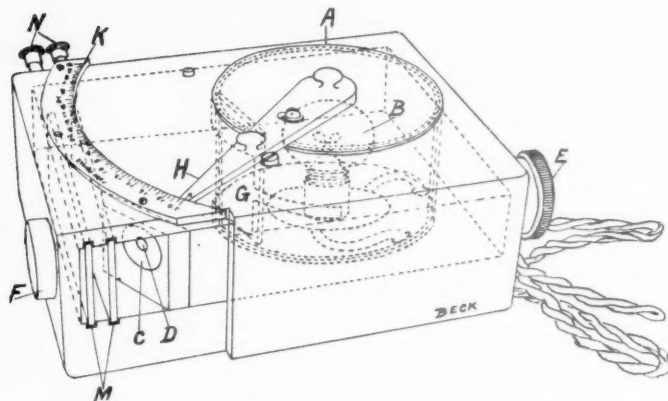


FIG. 22.—HOLOPHANE LUMETER PORTABLE PHOTOMETER

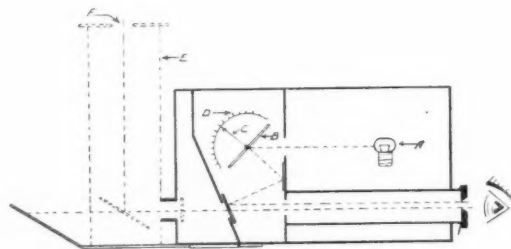


FIG. 23.—LUXOMETER PORTABLE PHOTOMETER

APPENDIX II.

PORTABLE ILLUMINATION PHOTOMETERS.

A very well-known form of portable illumination photometer is the Holophane Lumeter (Fig. 22). Inside a small box is a standard electric lamp B, the light of which is permitted to shine through an aperture with a movable shutter G on to a white disc C having a small hole D in the centre and fixed in a sighting tube E F. When it is desired to measure the brightness of any object such as a white card placed in any position or a patch of sky the sighting tube is directed towards the object and a small part of it is seen through the hole in the centre of the white disc. The lamp being switched on, the light falling upon the surrounding annulus of white disc is varied by moving the shutter until the disc and its central hole appear to be equally bright.

The spindle A which moves the shutter carries an indicating arm H across a scale K reading in foot candles. Equality between the brightness of the disc and the object seen through its central hole having been secured, the moving arm at once indicates on the scale the illumination in foot candles.

In order to measure brightnesses beyond the range of the scale, darkening screens M can be inserted in the sighting

tube beyond the disc by the knobs N. One of these absorbs 9/10ths of the light reflected from the object, so that a scale ranging from, say, 0.01 to 2 foot candles, reads, when this 10 per cent. screen is inserted, as indicating 0.1 to 20 foot candles. The second screen absorbs 99/100ths, and when it is in position the same scale would read 1.0 to 200 foot candles. When both screens are in together the same scale readings would indicate 10 to 2,000 foot candles. For measurements of daylight a cap containing an orange-coloured diaphragm is fitted to the end F of the sighting tube to equalise the difference in colour between daylight and the light from the standard lamp. For ratio readings, which are all comparative, the alteration thereby made to the calibration of the scale makes no difference.

A very similar instrument is the Luxometer photometer (Fig. 23), made by Messrs. Everett Edgecumbe, the only material difference being that the light on the comparison disc from a standard lamp A is varied by altering the angle of incidence by means of a movable mirror B carrying an index arm C reading on a scale of foot candles D. This principle of varying the standard light is adopted from the Trotter instrument—the parent of most modern illumination photometers.



FIG. 24.—FOOT-CANDLE METER. PORTABLE PHOTOMETER

In the Trotter a large slotted comparison disc is fixed to the top of the case, the slots receiving a variable illumination from inside. It is with this instrument that the author was first able to measure daylight intensities some 20 years ago and to establish the truth of the "ratio" system of measuring daylight which was devised independently by Mr. A. P. Trotter in South Africa and by himself in London. Daylight from sky is measured in the Luxometer through a removable vertical tube E at the top of which is a variable aperture E which admits only a small and measured portion of the light from the whole sky. This is the original method devised by the author for the Trotter instrument.

A very handy little instrument is the Foot-Candle Meter

APPENDIX III. SUNLIGHT.

(Reproduced from the Transactions of the Surveyors' Institution by kind permission of the Council.)

The determination of the number of hours of sunlight which will on fine days enter a room through a given aperture is a more simple problem than that of the daylight illumination which can be obtained through the same aperture. The simple case may be taken of a window on a vertical wall lighting a room, the horizon being partly obstructed by buildings. The point in the aperture through which light can enter over a maximum number of oblique directions, horizontal and vertical, is first obtained by finding the intersection of planes

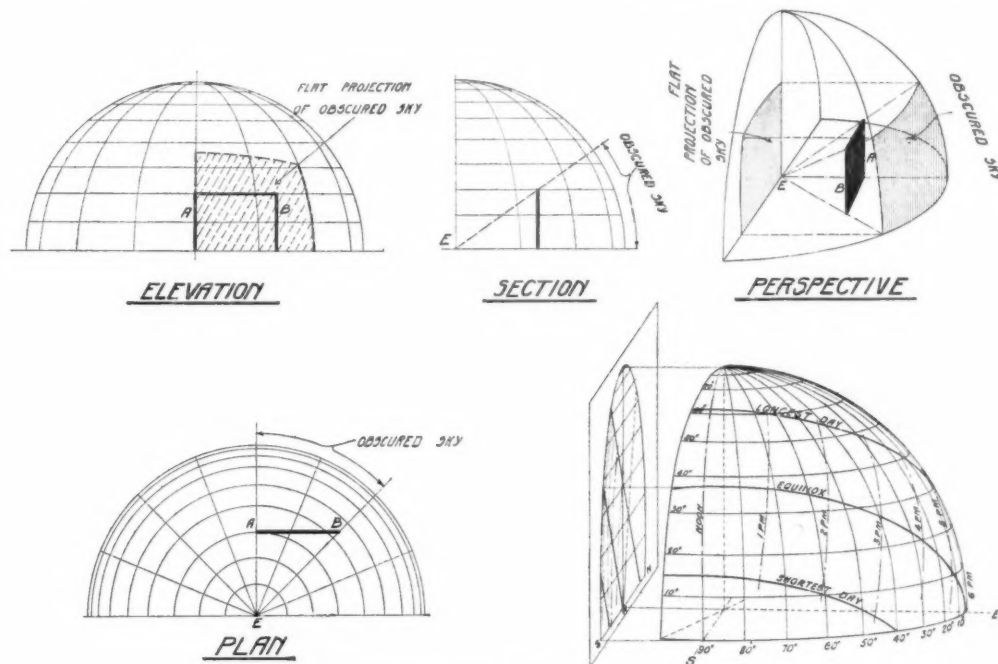


FIG. 25.—PRINCIPLES OF SKY PROJECTION FOR SOLAR DIAGRAM

(Fig. 24), which can be obtained from the British Thomson-Houston Co. In principle this is merely a tube with a small lamp at one end and a series of holes along one side.

As the illumination of any part of a white strip inside the tube and seen through the holes varies with the distance from the light the apparent brightness of the various holes will vary from one end to the other. They can be placed at suitable intervals to give a scale of brightness as foot candles, and so marked. The uniform brightness of an external surface round the holes similarly coloured can readily be measured by observing which of the differently illuminated holes is neither lighter nor darker than the surface which surrounds it.

The normal range of the scale of foot candles is from 1.2 to 50 foot candles; but by means of a rheostat this can be varied as desired to a bottom limit of 0.012 to 0.5, and to an upper limit of 2.4 to 100 foot candles, i.e., the scale as marked can be divided by 10 or 100 or multiplied by 2.

touching the inner and outer reveals. It is assumed, as in Fig. 25, that the sky opposite the window is a quartersphere, of which this point is the centre. Any rectangular obstruction will block out from the view of a window an area of sky of which the flat projection necessarily appears to be distorted. A flat projection of this quartersphere of sky is described, of any convenient radius, say 10 in., and divided up into convenient angular divisions by lines of celestial latitude and longitude (Fig. 26). Upon this flat projection are projected planes generating at the centre point and touching the reveals and head of the window, giving the total sky visible from that point in the window aperture which can receive light from the maximum number of directions. Similar planes touching the edges of obstructing buildings are also projected, so that the area left between such projected planes and those of the window opening represents the total visible sky. All that is then necessary is to trace across such visible sky the apparent

paths of the sun at different periods of the year, such as midsummer, midwinter, and the equinoxes; or, say, the 15th of each month, and to mark on these solar paths the points which the sun apparently passes at different hours of the day. The solar diagram, of which Fig. 30 is an example, shows at once the daily periods over which the sun can shine into the room through the aperture under consideration, and the prolongation of the sun paths across the obstructions, existing or proposed, shows similarly the loss of possible sunshine.

Viewed in a due east or due west direction, these circular paths are seen on edge, and in consequence their projections become straight lines, giving the diagram shown in Fig. 27, which shows a due west aspect with south (noon) on the left and north on the right.

In setting out a diagram a tracing of the flat projection (Fig. 27) is used. If this be employed for an east or west diagram, it will be obvious that the noon altitudes, being south and therefore on the edge of the diagram, can be marked

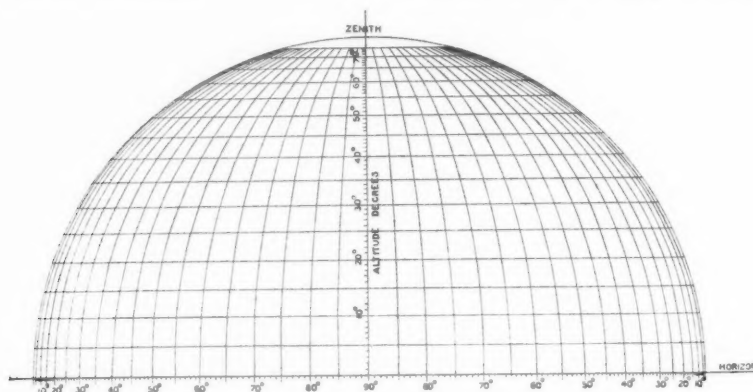


FIG. 26.—FLAT PROJECTION OF QUARTER SPHERE OF SKY

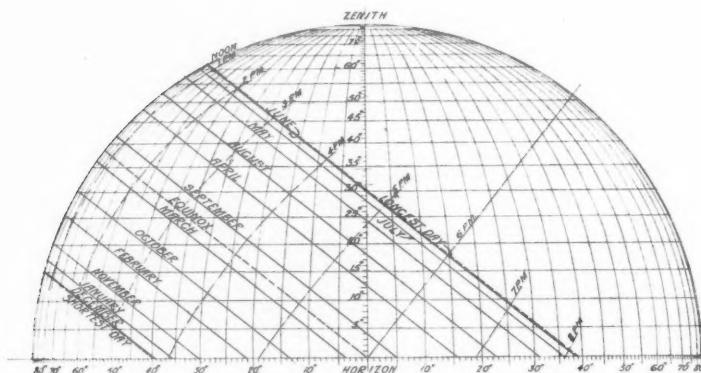


FIG. 27.—APPARENT SOLAR PATHS. ASPECT WEST

The following method of describing solar paths was adopted from that described in Molesworth's "Obstruction to Light," and will be found to be quite simple.

If the heavens be considered as a great sphere, the apparent diurnal path of the sun across that sphere will always be a circle inclined to the horizon, which circle the sun traverses once in 24 hours, or at the rate of 15° per hour. In the sun diagram, the sphere, with the sun paths traced on it, is supposed to be projected on to a flat plane, as in Fig 26, and the direction in which the sun paths are seen is determined by the aspect of the diagram; since these paths are circular, their projections will always be either straight lines or portions of ellipses.

on the circumference in degrees above the horizon. At noon at the equinoxes the sun is at a height above the horizon equal to the co-latitude (90° —latitude), and at 6 p.m. it is at the horizon due west, at the centre of the diagram. A straight line joining these points gives the apparent equinoctial afternoon sun path. The noon altitude for any other day in the year can be found by adding to the equinoctial noon altitude the "declination north" given in Whitaker or the Nautical Almanac for each day in the summer from March to September, and by deducting the "declination south" similarly given for each day in the winter from September to March. From these noon altitudes the apparent sun paths at dates other than

the equinoxes, viewed in a due east or due west aspect, may be described by drawing straight lines parallel to the equinoctial line from noon to sunset.

Since the sun traverses the equinoctial sun path at a uniform rate of 15° per hour, this path can readily be divided into hours and, if necessary, minutes, reckoning 15° per hour or four minutes of time to 1° . The equinoctial path is, like the base line of the diagram, a great circle of the sphere, and the paths for other times of the year are exactly similar to the parallel lines of celestial "latitude" drawn horizontally across the

a south-west aspect is 45° to the left of a due west aspect and 135° to the right of a due east aspect (Fig. 28). A south aspect is 90° to the right or left, and upon such a diagram (Fig. 29) it will be seen that the points on the equinoctial sun path shifted 90° across the diagram result in a complete semi-ellipse.

For drawing the elliptical paths of other aspects and times by joining up transferred points, large French or ship curves will be found to be more convenient than railway curves. Fig. 30 shows the application of these methods to an actual case.

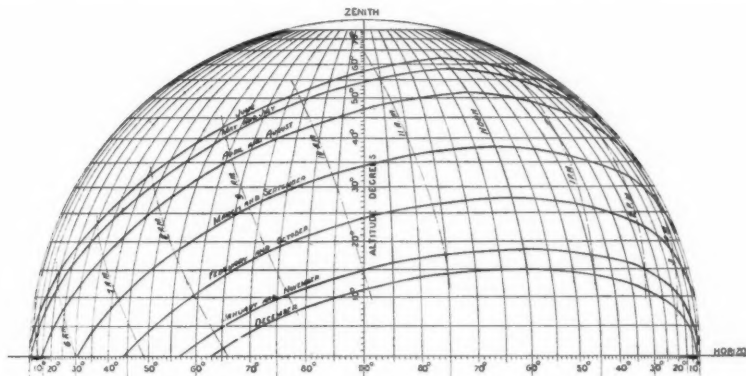


FIG. 28.—APPARENT SOLAR PATHS. ASPECT SOUTH 30° EAST

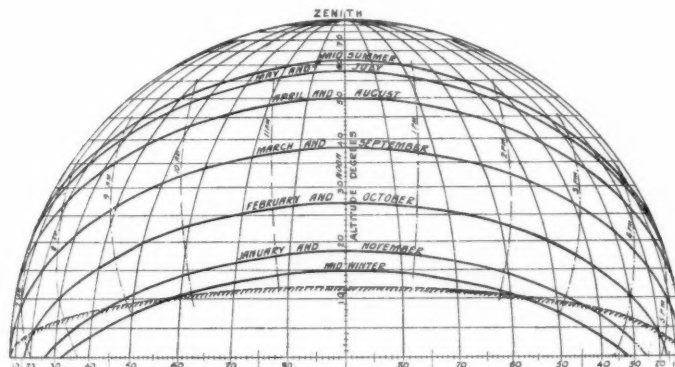


FIG. 29.—APPARENT SOLAR PATHS. ASPECT SOUTH

diagrams. By the construction of the diagram these lines are already divided into angular divisions by the curved lines of celestial "longitude," so that any required divisions of time can readily be transferred to the sun paths for any period of the year in an east or west aspect by means of a tracing of the lower $22\frac{1}{2}^\circ$ of the projected hemisphere, and of the similar $22\frac{1}{2}^\circ$ below the horizon (Fig. 26).

A due east or west diagram being now complete, a similar diagram for any other aspect can readily be obtained from it simply by shifting any number of convenient points on the straight line paths to the right or left by the number of degrees between the aspect required and due east or west. For instance,

Solar path diagrams will be found to reveal quite a number of unexpected points. They show, for instance, how very much lower the sun is as compared with what it appears to be. A winter elevation which only reaches 15° , and a summer elevation which only climbs up to its maximum of $62\frac{1}{2}^\circ$ at noon on midsummer day are both much lower than would be estimated by most people. The amount of possible sun from a north-eastern, or north-western, or even a northern aspect, is somewhat surprising. Sun diagrams also show that a due south aspect is not necessarily the most sunny with obstructions in front, especially in a long street of moderately high houses. Above an obstruction of 45° directly opposite

to a window only mid-day summer sun can enter, but in all oblique directions an obstruction of the same height subtends an increasingly smaller angle, as its distance increases with the obliquity. An obstruction which would subtend 45° directly in front of a window subtends only 36° in directions inclined to 45° to the right or left, whilst at an obliquity of 60° it drops down to 30° . Obviously, therefore, more sun will be enjoyed over an obstruction if the aspect be south-west or south-east, in which the position of the mid-day sun will reach its maximum elevation further along the street, where it will coincide with the more distant and therefore less severe obstruction.

The method of constructing the diagram from the point

which is most favourably situated to receive very oblique rays credits the window with ability to pass rays which can only enter a very short distance into the room. In view of the very great gain in cheerfulness which all parts of a room enjoy when even a very oblique ray of sunshine enters the window, this is perhaps not altogether unreasonable. But if it were desired to ascertain the hours of possible sunshine which would reach any particular point inside the room, such as a hospital bed, or, in the tropics, an instrument or piece of machinery upon which the sun cannot be allowed to shine for more than a short period every day, then a diagram for that particular point must of course be described.

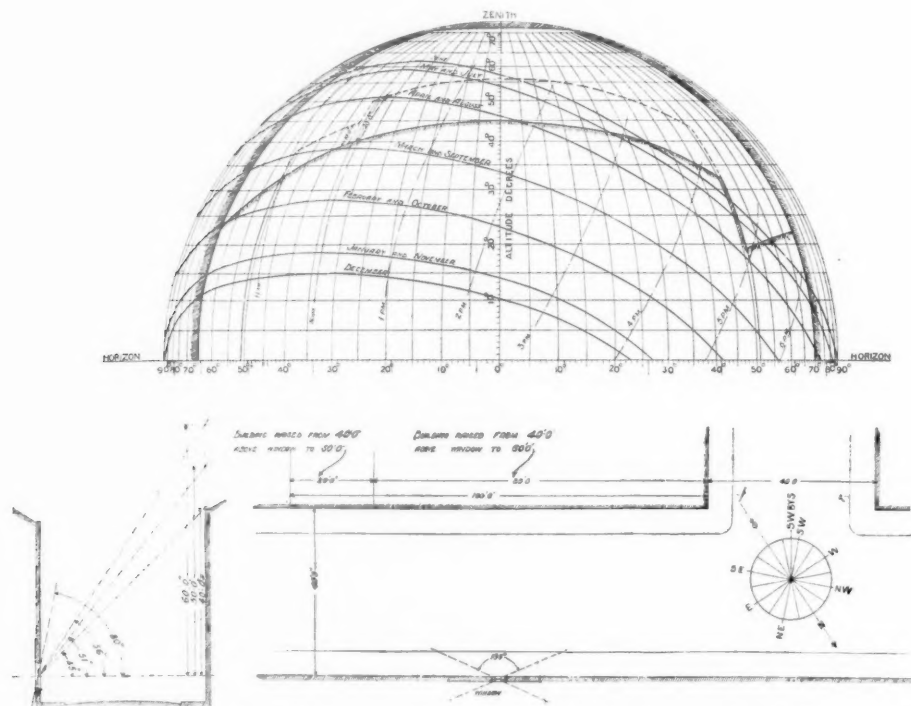


FIG. 30.—EXAMPLE OF USE OF SOLAR DIAGRAM TO ASCERTAIN LOSS OF SUNLIGHT DUE TO OBSTRUCTION

(The Discussion on Mr. Waldram's Paper will be published in the next issue of the Journal on 23 May.)

Exhibition of Mural Paintings

BY P. TUDOR-HART

The Exhibition of Mural Paintings, now being held at the R.I.B.A. Galleries, is an event of more than passing importance, connoting the reintroduction of the former collaboration of the architect, the mural painter and the craftsman decorator, which produced in the past such excellent and beautiful results.

In earlier times buildings comprised not only the structure of the outer shell, but also the interior decoration harmonising with the general architectural scheme, and it was in the interior that the magnificence of its beauty reached its culminating point. The first constituted the element without which the second could not find scope for its complete development; the second afforded the opportunity for the first to achieve its full significance. Without the loyal co-operation of these two factors architectural completeness cannot be said to have been attained, as witness many of our modern public buildings, which show a most lamentable dearth of interior decoration in the true acceptance of the term. The pitiful attempts to achieve a similar result are remarkable only for their inappropriateness and merely serve to demonstrate the loss that has been suffered by the cessation of collaboration.

On entering the R.I.B.A. Galleries this loss is at once borne in on the observant spectator. The ceiling of the Meeting Room cries aloud in its nudity for the exercise of the decorative painter's art, and the drab covering of the walls serves rather to accentuate than to hide their incompleteness. The mural designs temporarily displayed on the walls make plainer this most glaring deficiency, asking as they do for a home amid appropriate architectural surroundings, without which their entire artistic conception and emotional purpose fail to find expression. For it is abundantly clear that just as an interior requires the art of the decorator to complete the architect's design, so is it equally obvious that the design of the mural painter is completely lost without its architectural setting.

It is therefore greatly to the credit of those responsible for the hanging that, notwithstanding this unavoidable drawback—further complicated by the inclusion of photographs of mural paintings in their true setting, and of others deformed out of all proportion owing to the angle at which the camera has had to be placed, also of cartoon working drawings as well as complete full-scale paintings—there has been successfully achieved not only a clear and comprehensive exposition of the work but, in addition, a general homogeneous ensemble.

Before discussing the actual merits of some of the designs it might be useful to draw attention to those principles which should properly underlie all mural painting. **FIRST.**—The planes of all painted surfaces should be sedulously preserved and the decorative design of every wall space ought to be complementary, and never antagonistic, to their geometrical shape. It is only where the architect has himself been at fault in introducing a structural shape inconsistent with or contradictory to the general architectural scheme of the room, that the mural painter may legitimately depart

from this rule, and then only in so far as he is able to achieve by this departure a more harmonious ensemble. **SECOND.**—Tone and colour values or plastic relief can only be used by the painter as a means of suggesting the third dimension without attempting to create an optical illusion, and they should be judiciously restricted to the architectural features of the whole room or that part of the room which in itself constitutes a complete architectural feature. **THIRD.**—All attempt at enforcing a personal predilection in derogation of the architectural surroundings should obviously be avoided by the mural decorator, as it can only result in the painter's defeating his own object as well as that of the architect. The subject matter for pictorial representation is unimportant from the decorative point of view, always provided that its emotional qualities of colour tone and lineal design are consistent with the purpose of the architectural structure. It is obvious that a variety stage subject would scarcely be appropriate in a building destined for devotional purposes.

How hard it is to comply with these principles under the unsatisfactory conditions now existing is demonstrated by the fact that the work of even so experienced a painter as George Clausen is not always above reproach, exemplifying how important it is that the mural painter should have ample opportunity afforded him to practise his art under the freer conditions of unrestricted access to the wall itself and intimate collaboration with the architect and the craftsman.

George Clausen's four working cartoons, apart from their own merits, are interesting to see in comparison with the finished design, photographs of which are shown—unfortunately without their architectural surroundings. One of these—for the design entitled "Morning"—is remarkable for its homogeneity of design, in the distribution of the tone values and the accents derived from the contours of the figures in combination with the tones, markedly in the flesh tones of the man's figure, his right leg and foot combining with the flesh tones of the head and bust of the woman and head, arms and legs of the child, forming a rhythmic design of advancing value masses that encircle the receding mass of the woman's skirt. On the finished design, however, this order of things is partly reversed, the flesh tones of the child's figure combining with the mass of its dress and ceasing to form part of the rhythmic design displayed in the cartoon. The dark skirt of the woman's figure becomes an important accent instead of the effaced mass it presents in the cartoon. Again, the two figures in the design entitled "The Golden Age" gain when they are cut away from their surroundings and are inclosed in a rectangular frame, as shown in the detailed photograph. Amputation does not improve a well-conceived design.

These designs, decorative in themselves, tend to deform the geometrical shape and proportions of the spaces they were intended to decorate, and by filling in the corners and laying too much stress on the bottom of the tympanum they produce the effect of flattening

out the arch and accentuating the emptiness of its central focus. Yet, despite these defects, it is evident that the whole design serves its purpose, enhancing the decorative effect of the walls.

F. E. Jackson's large design for a tympanum shows, on the other hand, a decorative conception consistent with the geometrical shape of the wall surface, but admitting of application to no differently-shaped surface without destroying its decorative effect and impairing its emotional merit. The pyramidal mass of the two figures of France and Belgium fill in the centre of the wall space, accentuating its natural focus and affirming its dimensions and shape of contour. The small masses emphasise the rectangular shape of the base without deforming the arch, while at the same time the emotional presentation of the subject is well maintained. Unfortunately, his colour values, instead of confirming, destroy the relationship of mass and tone. The sharp contrast between the saturated red robe of France, enhanced by the blue spots of the mantle, and the dark neutralised green (low-toned yellow—to give it the correct colour designation) robe of Belgium, disconnect the two figures by inverting their planes and destroying to some extent the strength and vigour of the whole design. Much of the charm of brilliant colour in the left-hand corner of the picture, which would otherwise tell, is thus destroyed.

Mrs. Sargent Florence's four cartoons are remarkable examples of working drawings with careful observance of their mass relationship. Three simple tones are used to suggest the balance of the pattern of the design. The red chalk, the yellow tracing paper and the background tone of the paper cause the design to stand out in clear, well-defined masses of decorative effect. They suggest a businesslike clearness of mass designing that precludes any possibility of surprise during the course of the work. For the sake of comparison it is a pity the photographs of the finished work are not shown.

Miss Ethel Walker's cartoon, by virtue of its delicacy and elegance of form, and the balance of its tone values as well as the harmony of subdued colour, is one of the most decorative achievements in the exhibition. The artist's native sense of tone and colour values is marred by an obvious lack of technical knowledge.

S. I. Hichens's large decoration for a *reded* is an example of a design created to fit a space and preserve its geometrical shape, and the drawing showing the design in its setting demonstrates the advantage of correct surroundings. Its decorative qualities depend in great measure upon the use of formalism in the design, in which he displays both imagination and individuality. The artist's knowledge of colour value is at fault, however, for he loses much of the emotional beauty of the blues and violets by the abuse of yellow and yellow green (broken yellow-orange). Not only have these colours been too extensively used, but they have been employed to depict both vertical and horizontal shapes, giving to the whole design a peevish effect, inconsistent with the peaceful lineal conception.

R. Hallward shows several interesting designs for church decoration. One, that suggests in its colour scheme and pattern a design more suitable for a dwelling house than a church, is particularly pleasant in its colour arrangement.

Mrs. Sargent Florence's sketches for frescoes executed

at Bourneville School demonstrate that fresco painting can be treated by an artist in a decorative sense quite modern yet full of life and human interest.

And Miss Mary MacDowall, in her frescoes at the same school, shown by a series of photographs, treats her subject, episodes in the life of Christ, with naïveté and obvious sincerity.

Photographs of the frieze designed and executed by Miss Lanchester, Miss Lawrence and Mrs. Meeson Coates in tempera and water wax, also a photograph of true fresco executed by the students of Mr. Batten's class are interesting as showing examples of work actually carried out upon the wall.

It is regrettable that J. D. Batten's fresco paintings are represented only by photographs, as it would have been interesting to have seen the technical quality of the true fresco painting from the hand of one of its best exponents.

However, F. E. Jackson's "Eve," with its excellent decorative qualities, affords an opportunity of judging the peculiar charm and surface texture of this medium and reveals its unrivalled suitability for mural painting.

Miss Lanchester has some interesting examples of *Le Bègue* (water wax) medium.

On the subject of the craft there remains little for me to say, Mr. J. D. Batten having ably dealt with it in his paper read before the R.I.B.A.* I agree with Mr. Batten that true fresco, provided it be well prepared and laid, is quite as suitable to resist our climate as that of Italy. If anything the advantage would lie with us, always assuming that the lime sweating has, as it should in good craftsmanship, completely encased the painter's pigment. The power of fresco painting to withstand the foul air of cities is, I am persuaded, more than doubtful.

The matte surface of fresco, which allows the painting to be viewed from any angle without sheen, in addition to its peculiar beauty of tone and colour, makes it an unrivalled medium for mural painting in all cases where great richness and saturation of colour are not required.

Encaustic painting, either applied directly as a medium mixed with the pigment, or as a protective coating overlying true fresco, is also a sound and durable medium for mural decoration. Where strong, rich colour and tone are required it has the advantage of lustre with little sheen.

Size and oil emulsion paint is also a good medium for painting directly on walls, but its duration depends upon the plasterer's skill in preparing and laying the ground.

Oil painting on canvas *marouflaged* is the least worthy of recommendation for mural decoration. First, because oil paint will not resist the corrosive action of long exposure to the air without a thin protective coating of oil, which produces a reflective surface with all its disadvantages. Secondly, it cannot be *marouflaged* without danger to the paint before the latter is thoroughly dry, a matter of three to ten years according to the thickness of the paint. If there be the least trace of moisture in the wall either at the moment of, or subsequent to, the *marouflaging* the ruin of the paint is more certain than in the case of fresco. Lastly, darkening of oil paint will take place unless occasionally exposed to direct sunlight.

* It is hoped to publish Mr. Batten's Paper in an early edition of the Journal.

TRIBUTE TO SIR ASTON WEBB,
PAST PRESIDENT R.A.

THE DUKE OF YORK'S SPEECH AT THE ROYAL
ACADEMY BANQUET.

At the annual banquet of the Royal Academy of Arts, held at Burlington House on 2 May, the Duke of York, who was the principal guest, specially referred to the presidency of Sir Aston Webb and to his position as an architect. The Duke said in the course of his speech, replying to the loyal toasts, "To most of us, the event of peculiar importance in the world of art during the past year was the retirement of your late president and the appointment of his successor, whom we are so glad to see in the presidential chair to-night. Unquestionably Sir Aston Webb was the recipient of a noteworthy tribute when the Royal Academy departed from its time-honoured custom by choosing an architect as its president. I understand that, since the days of Sir Joshua Reynolds, the almost invariable rule has been that the distinguished office of President of the Royal Academy shall be filled by a painter. Sir Aston Webb's election broke a long-standing tradition, and it was hailed both as an honour to architecture and as a well-deserved recognition of one of its most distinguished exponents. A native of London, whose chief works are to be found within her boundary, our city claims Sir Aston Webb in a very intimate sense. She gave to him in the restoration of St. Bartholomew's, Smithfield, one of his earliest commissions, and he has richly contributed to her adornment in buildings recognised all over the world as architectural achievements of the very highest order. Perhaps the best known of these, by reason of its situation, boldness of conception, and dignity of treatment, is the Admiralty Arch, which will stand as a monument to your late president as long as London remains. Sir Aston's work, too, on the Tate Gallery Board, St. Paul's Cathedral Committee, and the Royal Fine Art Commission, to mention a few of his many activities, shows that his knowledge of affairs is of value second only to his skill in architecture, and for his work in these directions London in particular and the nation in general will ever be grateful. I feel I shall be giving expression to a sentiment common to us all in expressing the hope that Sir Aston Webb will soon enjoy complete recovery from his most distressing accident of last May."

Reviews

LONDON. *Her Traffic—Her Improvement and Charing Cross Bridge.* By Captain George S. C. Swinton. London: John Murray. Price 1s. net.

Captain Swinton has been well advised to publish his ideas on London and its problems. No one has medi-

tated more faithfully on the defects of our metropolis, and it is worth while to have set these down and thus to offer hints as to the needful ameliorations, even where a definite conclusion is deemed beyond reach.

This is the line the author has taken. With perhaps an undue diffidence as regards his technical equipment for his task he reviews alternative proposals, often reserving his own views. Where he gives these they are of sufficient interest to make the reader desire that he had allowed himself more latitude in this direction.

In Chapter I, after glancing at the relative values of omnibuses and tramway services, Captain Swinton points out the difficulties that have arisen through our main roads being converted into shopping streets, and suggests that efforts should be made to find and develop alternative routes.

He next reviews the road junctions and crossings, which, at the present time, are responsible for our more acute traffic problems, and recites various solutions that have been offered in special cases, including bridges, tunnels, and the circulatory system, though as regards the latter the argument needs further expansion to make the advantages and disadvantages clear, as the volume of traffic in London makes demands that cannot be thus met in even the largest of our open spaces, and any line of circulation to be efficient must be more of the nature of a one-way route extending around several blocks of buildings.

Underground provision for parking vehicles and further underground footways secure mention. The revision of our urban railway lines is brought into the account, and the desirable extensions of these eastward and cross-river communications are also envisaged. Provision for flying services is given a passing note and Chapter I closes with a criticism of the constitution of the Traffic Authority and a suggestion that a "Traffic Brain" would be more to the point. Let us hope that the one may lead to the other, as it is obvious that a representative body could not take the place of a technical one, in devising sound remedies on imaginative lines.

Chapter II, after a brief reference to the past, goes on to review our failures at the present time in visualising the needs of London in the immediate future and a number of suggestions are made, most of which deserve serious consideration. In many cases the cost would be comparatively trifling, and in others the proposals look as if they could be justified on the grounds of amenity and convenience.

Pedestrian traffic, street architecture, the activities of the advertiser and London's ever-present problem of smoke, fog and dirt are glanced at in turn, and many aspects are summarised in the paragraphs dealing with a possible London really worthy of its importance.

Chapter III deals specifically with the question of Charing Cross Bridge. Here Captain Swinton has a definite suggestion to make, viz., that a new bridge should be constructed with two decks carrying an electrified railway on the lower and the road on the upper one, the road forking on either side of a reconstructed station, the western branch leading into the Strand and the eastern one bridged over this street and debouching into Charing Cross Road at the Cavell monument.

This scheme would provide a route for north and south traffic independent of the Strand and Embankment, while

the bridge, though too high for the best effect, would be several feet lower than the existing one. At the same time it has serious defects. It may be doubted if any scheme delivering another stream of traffic into Trafalgar Square can be accepted, and this one is not happy in emerging into the Strand close to the Grand Hotel, at a very congested corner. Again, the Strand bridge at Villiers Street would detract from the appearance of this thoroughfare; moreover the plan hardly suggests a satisfactory solution from the architectural standpoint, and, lastly, the high level of the road would make the approaches on the Surrey side difficult to plan and costly to execute.

These criticisms are not intended to belittle the value of Captain Swinton's effort to solve this problem, which has the merit, shared by few of the plans hitherto put forward, of recognising that any bridge at Charing Cross must provide for its traffic independently of the Embankment and the Strand. Possibly there may be a better solution, and we cannot help thinking that when this undertaking appears likely to be realised such a solution will be forthcoming.

H. V. LANCHESTER [F.].

GARDEN CITY HOUSES. *Fourth Edition, Revised and Enlarged.* The Architectural Press, 9, Queen Anne's Gate, Westminster, S.W.1. 7s. 6d. net.

Undoubtedly the really interesting thing about this book is the Specification at the beginning of the book.

Since the war we have all seen so many hundreds and thousands of designs for small houses that one's brain reels in the least attempt to pick one's pet half-dozen. And this book alone contains enough designs to make one at least a little dizzy in the attempt to review the book.

You may put it down to my faint-heartedness on being confronted by these serried ranks of cottages if you like, but I really feel that in the Specification given at the beginning of the book, we are getting down to brass tacks. But, all the same, I have a serious criticism to make of it, and that is that it is not full enough.

I should like to see more examples given of different methods of treatment of similar kinds of work. This might well be done in the same concise and clear manner in which the Specification is given. The authors' notes under each trade heading are particularly useful. As it stands, a very excellent basis is given on which architects can easily build up a good specification for a house of almost any design.

The numerous designs for cottages and small houses are shown by photographs, elevations and scale plans. A particularly interesting feature of the book is in showing the photograph and drawn elevation in juxtaposition. With regard to this, the photograph is usually the least flattering.

The book consists of well over a hundred pages of plates in addition to the Specification. Nearly forty pages at the end of the book are given to working drawings and photographs of interior decoration.

E. FRAZER TOMLINS.

The Library

UNE CITÉ INDUSTRIELLE. Étude pour la construction des villes, par TONY GARNIER. ob. fo. Paris nd. £4 4s. [A Vincent, 4 Rue des Beaux-Arts, Paris.]

This is a volume of plates illustrating an imaginary city in the south-east of France. The motive force of industry in this city is derived from water-power, and in other respects ideal social conditions appear to have been assumed. The designs, which cover a wide range of subject, are especially worth examination, as they are a study in what may be described as *rectangular* architecture. Not a single gabled or hipped roof is shown, and both industrial and domestic buildings are flat-topped. Within this limitation the artist succeeds in inventing a considerable variety of architectural forms which undoubtedly have an urban quality, and should be of interest to every student of civic design.

A. T. E.

AMURATH TO AMURATH. By GERTRUDE LOWTHIAN BELL. 2nd edition. 8vo. Lond. 1924. £1 1s. [Macmillan and Co.]

This is a second edition of this charming book, the first having been published in 1911, and records a journey along the Euphrates valley.

In addition to numerous plans and photographs of the ruins left by successive civilisations in the region there are many shrewd and amusing comments on the habits and politics of the people.

C. E. S.

ADOLFO VENTURI. *Storia dell'arte italiana.* VIII. L'Architettura del quattrocento, parte 1. la 8ª Milano, 1923. £1 8s. [Ulrico Hoepli, Milano.]

This is the eighth volume of a remarkably complete work on all the arts of Italy, of which the first volume was published in 1901.

The work treats of the architecture of the Quattrocento, perhaps the most fascinating of all periods when mediæval freedom and daring were combined with classic detail and most exquisite sculpture.

C. E. S.

NIEUW-NEDERLANDSCHE BOUWKUNST. By Professor J. G. WATTJES. 4to Amsterdam [1923]. 18s. [Amsterdam: Uitgevers-Maatschappij "Kosmos."]

This book may be regarded as supplementary to the paper on the same subject read at the Institute on 14 April by Dr. D. F. Slothouwer, and published in the JOURNAL on 10 May, and does not therefore call for detailed notice. It is well produced but not very well arranged; there is no index, the plans are all jumbled together at the end, and for many important buildings no plans are given.

Apart from the judicious use of plain surfaces in many of the designs, the chief interest is in the illusion of massiveness often obtained by the architects with what appears to be very flimsy construction.

It is reassuring to learn on the authority of Dr. Slothouwer that plans such as Nos. 136 and 137 are going out of fashion.

C. E. S.

LES MONUMENTS MAURESQUES DU MAROC. By J. DE LA NÉZIÈRE. fo. Paris [1921]. £4 10s. (Paris: Éditions Albert Lévy.)

This handsome portfolio, containing 100 heliogravure plates, of which several are in colour, illustrates very completely the Moorish buildings of Morocco. Hitherto these monuments and their decorative details have not received the same amount of attention that has been devoted to Muhammadan architecture in Spain, Egypt and India, and the Institute Library has done well to acquire this publication. There is an illustrated introduction, and fairly complete descriptions of the various plates. Marshal Lyautey contributes a preface.

M. S. B.

Discussion on the Annual Report

(ANNUAL GENERAL MEETING, 4 MAY.)

THE PRESIDENT (MR. J. ALFRED GOTCH) IN THE CHAIR.

THE PRESIDENT: I have now to present the Report of the Council and Standing Committees for the official year 1924-1925, and to move its adoption by this Annual General Meeting.

The Chairmen or other representatives of all the Committees whose reports are appended to the Council's report have been asked to attend this meeting so as to be in a position to answer any questions that may be asked in connection with these reports.

MR. KEEN: I have to second the President's proposal for the adoption of the Report as printed.

THE PRESIDENT: The Report is now open for discussion.

MR. WM. WOODWARD [F.]: Mr. President and gentlemen, I am happy to say that this is the thirtieth occasion in succession that I have had the pleasure of epitomising the Annual Report of the Council. To-night the Report is rather more voluminous than at other times. I was very pleased to hear that the Chairmen of the various Committees are here; but, so far as I personally am concerned, there will be very little for them to answer, because my criticisms to-night will be of a very mellow character, and I shall leave the younger men to pitch into the Council, and not to deal with them in the way that I adopt to-night.

I am very sorry to say that we have lost three past-Presidents during the year, 19 Fellows (including one Honorary Fellow), 26 Associates (including 3 Honorary Associates), and 19 Licentiates. With regard to membership, taking the years 1923 and 1925 (omitting 1924) there is an addition of 242 Fellows and an addition of 792 Licentiates.

Assessors and Arbitrators. The crumbs which have fallen from the rich man's table are this year very numerous, and I may say, *en passant*, that the names of William Woodward and Charles Woodward are included in those crumbs.

Amongst the exhibitions in the galleries were the pen and pencil and pastel sketches of Mr. T. Raffles Davison, and those who know him will agree with me that when he has done us the honour of drawing perspectives of our buildings he has strengthened our weaknesses, and he has given dignity and proportion to the design of busy architects who obtained his assistance in the perspectives which he so beautifully executed.

The Royal Fine Art Commission. I quote here: "The Council have watched with interest and appreciation the first year's work of the newly-constituted Royal Fine Art Commission." Last year I had a good deal to say about this Royal Fine Art Commission. To-night I will say I regret I am not aware of any of this year's work, so I presume this Commission has been 'doing good by stealth and will ultimately blush to find its fame.'

London Building Acts Committee. I quote again: "After more than a year of unremitting labour, the London Building Acts Committee completed a Report in April 1924." That has been submitted to the London County Council, with an invitation for an extended con-

ference. I leave that for your contemplation. There does not appear to be any undue rush in this matter, which could have been, perhaps, of use to the profession.

The Architects' and Builders' Consultation Board. Delightfully academic. My own opinion is this—and I have expressed it in the public Press: no good whatever will arise to the building industry until the Trades Disputes Act of 1906 is repealed. Then there will be no more "ca' canny," and then shop-stewards, and the tyranny which accompanies them, will be eliminated. Until that day arrives, do not waste your time—I shall not waste mine—in patting on the back the Trade Union leaders, unless that Act is repealed.

Report of the Board of Architectural Education. That occupies 5½ pages of the JOURNAL. There are 21 members of it, and they have had seven meetings. I shall refer hereafter to the number of attendances at meetings of these Committees. It may be through illness, or through circumstances over which they had no control that members did not attend, but I say that no man, however eminent, should consent to become a member of any of these Committees unless he has reasonable ground for believing he can attend the meetings. When I come to the attendances, you will probably agree with the observations I have made. I know that in several instances illness has prevented attendances. With regard to the Board of Architectural Education, one professor attended only one meeting; one architect attended only one meeting. But I will add that Professor Reilly attended every meeting, much to his credit. This Report appears to me to indicate an interesting mixture of good work and dilettantism.

Report of the Art Standing Committee. There are 21 members, and there were seven meetings. Six members never attended at all, one only attended once, and three only attended two meetings. With regard to this Committee, I see that Waterloo Bridge is mentioned, but they have not referred to St. Paul's Cathedral. I am sure that every one will agree with me that *The Times* newspaper is to be heartily congratulated on its magnificent efforts by which St. Paul's Dean and Chapter have obtained a quarter of a million of money. I have been trying, for three years past, to find out what is the matter with St. Paul's. I have visited it from top to bottom two or three times, and I have asked to be told where to put my hand on a particular part where there is a defect. I say this—and I challenge contradiction—that St. Paul's Cathedral to-day is as safe, structurally, as it was when Sir Christopher Wren left it—"Oh"—and I am sorry there should be so much dispute and difference of opinion amongst the experts. I am equally sorry that there should be so much dispute and difference of opinion between experts *re* Waterloo Bridge. What must the public think of the engineering and the architectural professions if they cannot agree amongst themselves as to what is the matter with those two important structures? It is not a credit to either profession.

Report of the Literature Standing Committee. That Committee held seven meetings, and there are 21 mem-

bers. One did not attend at all, three attended only once, but three attended every meeting. This is a very important Committee, because it includes the Library. I and others have mentioned the danger which threatens the finest architectural library in the world. I ask what have you done since last year? I know I ought not to anticipate the answer. During the last twelve months 210 volumes and 29 pamphlets have been added, and the attendances of readers in the Reference Library numbered 8,095. There is a very important addition to this Report, and I look upon it with great satisfaction, *viz.*: "The number of tickets issued for admission to the Library, other than to members of the Institute or to students or probationers, was 155." Why I am satisfied with that is, that there are some outsiders evidently deeply interested in architecture who come here and take advantage of this Library, and I am glad the opportunity has been afforded them to study architecture.

Report of the Practice Committee. It is not because I have been on the Practice Committee myself in years gone by that I say this, but I think I shall have the meeting with me when I remark that the Practice Standing Committee is the very best practical Committee sitting in connection with the Royal Institute. And let me tell you about the attendances. Nine meetings, and there are 21 members. Four members attended every meeting, including my son, Charles Woodward; four attended eight meetings, four attended seven meetings, three attended six meetings. You will agree that that is a magnificent record of attendances on this excellent Committee. It has done good practical work, and we should all be very pleased indeed if we could get some of the work of that Committee for the education of the young and of the old architect, not only transmitted to the Council, but published for the benefit of the profession at large.

Report of the Science Committee. I have no doubt there is a great deal in the acquisition of scientific knowledge, and a great deal in research. I ask the Chairman of this Committee what he has done, or what the Committee has done, to communicate with the Office of His Majesty's Works to resist the dreadful decay of stone which is going on in the finest Gothic building in this country, or in any other country, of its class, *viz.*, the Houses of Parliament. I understand that in the estimates for this year, a sum of £4,000 has been voted for the Office of Works to deal with this stone work. Why, you want £400,000 unless some steps are taken to resist this decay.

Report of the Competitions Committee. They have had eight meetings; three members attended every meeting, three attended seven meetings, but two did not attend at all. The other attendances were very poor. But some good work, no doubt, was done. This is one of the poorest-attended Committees.

I see the Committee refers, on page 381, to public buildings. One of the most important matters connected with the profession is this very question. A resolution was passed by a general meeting on 16 February 1925, and it was published in the JOURNAL of 21 February, and on page 272 you will find this: "That all public buildings paid for out of the rates or other public funds should be technically and architecturally worthy of the locality. To achieve this end, the design of such buildings should be either the subject of competition or entrusted

to a qualified architect. And, further, that this resolution, if approved, be forwarded to the appropriate authorities." The resolution was passed *nem. con.*, and I ask that the proper person will tell me whether these words were complied with, *viz.*: "be forwarded to the appropriate authorities." Take for example only a few items of the proposed expenditure on public buildings by the Office of Works for this year, *viz.*: Ministry of Pensions, Hospital at Leeds, £132,000; British Museum, new storey to Library, £66,000; Geological Museum, new building, £225,000; National Physical Laboratory, new Physics building, £33,000.

Report of the Town Planning Committee. There are 28 members, 5 meetings. This seems to me to have been the very worst attended Committee of the whole lot. Twelve of its members did not attend at all; there are some ones, some twos, some threes. Only two attended every meeting. I do not think it would lead to a revolution if this Committee ceased to exist.

Report of the Hon. Auditors. This is a detailed report and deserves very careful reading. It shows a very satisfactory state of things, and it is pleasant to read that the surplus for 1924 was £1,239, particularly remembering the heavy expenses which the Institute incurred during that period. I think our best thanks are due for that Report, to Mr. Stephen Ayling and Mr. Hutchinson for their excellent work. The finances of the Institute are excellently dealt with by Major Harry Barnes, Chairman of the Finance Committee, and he also deserves our thanks for the detail he has gone into.

I reserve to the end a very important matter for the consideration of the Council, namely, the condition of the office of this Institute. To-day, the accommodation is hopelessly insufficient. When you enter the Institute, what do you find? Your entry is stopped by what we euphemistically call a "counter." You see several men—that is, you see them if they are not embedded among papers. It is badly lighted and badly ventilated, and the occupants are interrupted in their work by callers. I am sure you will agree that our offices are not worthy of the Royal Institute. I do not mind what expenditure within reason is incurred for their improvement. I sincerely hope we shall deal with this matter, and if the new offices are carried out as well as this room was, we shall all be satisfied.

And now I come to the staff, which now comprises 20 members in all. (Mr. Woodward enumerated the members and their years of service.)

I think you will believe me when I say I like to pay well all who work for me, because if you pay a man or a woman well, as a rule, they work well. Why is the number of the staff the same as last year? The first reason is that there is no accommodation; the second is that the members of the staff work hours and hours, night after night, overtime for which they are not paid. That ought not to be. Without going into detail, you will agree that additions to salaries should be in accordance with the position of the various members of the staff, and I shall be very disappointed if next year there is not an addition of £1,000, spread over the entire staff.

Last year, I referred to you, Sir. I said "My last few words are about our President. I am one of those who say that the proof of the pudding is in the eating. I am something of a gastronomist myself, and the half

of the pudding I have consumed has been very nutritious and easily digested. We have the other half of our President's pudding to consume, and, judging by our experience of the first half, we shall agree that the Presidential pudding has been a remarkably good and satisfying one, and when Mr. Gotch leaves the chair at the end of his term, he will do so with as much *éclat* as that of his predecessors." Now, Mr. President, I venture to say this to the meeting, in your presence: we have all had considerable experience of our President, and we all thoroughly agree that Mr. Gotch will leave the Presidential chair not only with the sincere regard, but with the deep affection of every member of this Institute. We all know the expenditure of time he must have given during his Presidency; we know what it involves, and you will agree with me that at every meeting he has, as his great predecessor Paul Waterhouse did, always dealt with matters with that fair-mindedness which should distinguish every President.

And I must not forget that Mr. Arthur Keen is leaving the post of Honorary Secretary, after serving six years in that office. The amount of time and attention he has devoted to that office not many of us know, and if his successor carries on the work as well, we shall be only too grateful. I thank you for the kind attention you have given me.

The PRESIDENT: Has any other member any observations to make?

Mr. R. STEPHEN AYLING [F.]: On behalf of my co-adjutor and myself, may I thank Mr. Woodward for his kind remarks in thanking us for our duties as Honorary Auditors? The books are so excellently kept by Mr. Baker and his staff, and also by our Chartered Accountants, that our work as auditors is practically negligible.

The PRESIDENT: I will put the motion for the adoption of the Report to the meeting.

Carried unanimously.

The PRESIDENT: The list of attendances at the Council and the Standing Committee meetings has been laid on the table, and will be printed in the next issue of the JOURNAL, and also sent out to members with the voting papers.

I beg to move that a hearty vote of thanks be accorded to Mr. R. Stephen Ayling [F.], and Mr. C. E. Hutchinson [A.] for their services as Hon. Auditors for the past year.

Carried by acclamation.

The PRESIDENT: Mr. A. H. Goslett [F.] and Mr. F. J. Toop [A.] are both eligible and willing to be nominated as Hon. Auditors for the current year, and if it is your pleasure, I beg to move that these gentlemen be so nominated.

Carried.

Mr. HUTCHINSON: I would like to second the hearty vote of thanks to Mr. Keen for his services as Hon. Secretary. We know the enormous amount of work he has put in, and we are all deeply grateful to him for all the work he has done.

Carried by acclamation.

Mr. KEEN: Gentlemen, I accept your congratulations and compliments with the greatest possible pleasure and gratitude. I have done nothing for the Institute which it has not been a pleasure to me to do. And as regards the future, I have not the smallest misgivings about the office of Honorary Secretary, if I can forecast

who is going to be the holder of that office during the next, and, I hope, for several years to come. If my office falls upon Mr. Stanley Hall, as I hope it will, I know you will be admirably served by your Honorary Secretary.

THE DEATH-WATCH BEETLE.

In 1922 there appeared in the JOURNAL an account of the measures taken to preserve the roof of Westminster Hall from further destruction by the wood-boring beetle. The account was illustrated by photographs of the death-watch beetle at its various stages of development (grub, chrysalis, beetle) and concluded with a description of the chemical solutions devised by Dr. H. Maxwell Lefroy for spraying the timbers, the method of applying the solutions and the names of the firms who supplied the apparatus and the solutions.

Further information on the death-watch beetle may be found in the leaflet just issued by the Society of Antiquaries, which can be obtained free on application to the Assistant Secretary of the Society.

In the preface Lord Crawford and Balcarres, President of the Society, emphasises the alarm that has been aroused in recent years by the ravages of the beetle, and states that the "Society of Antiquaries is anxious to offer advice to those who may desire fuller information than that contained in the circular."

Dr. H. Maxwell Lefroy, the writer of the pamphlet, is equally emphatic as to the damage done, for he says that it has been found that nearly all buildings in which oak has been used for roof timbers, flooring, screens, etc., are now, or have been, infested with the beetle which eats tunnels in the solid wood, gradually destroying it, and he mentions the case of an oak floor laid down as late as 1882 which has already so perished as to be useless.

Defective ventilation is a contributing cause, and wall-plates, purlins and the ends of rafters in walls should be examined.

The pamphlet is illustrated by photographs to scale of pieces of wood showing the holes made by the death-watch and furniture beetles. In surveying a roof or other oak structure these holes should be carefully examined; if they are fresh and clean-cut recent and active attack may be expected to be in progress; if all the holes have dirty edges and are of the same colour as the surface of the oak they are probably old and do not indicate present attack. Another and important point to look for is the excreta (pellets) of the grubs. If this is continually falling, or if fresh heaps are found below fresh holes, it may be anticipated that attack is in progress.

The method employed to kill the beetles or grubs consists of the application by means of a spraying machine of a liquid that thoroughly wets the timbers, penetrates any decayed part, enters any beetle holes, gives off a vapour that destroys the grubs inside and leaves behind an invisible, unalterable film of poison which kills emerging beetles or kills the grubs seeking to enter.

As to the time and expense involved Dr. Lefroy states that an ordinary church roof may be treated in a day, and unless structural alteration is required the total cost may not exceed £50.

The Society of Antiquaries desires to emphasise two points: first, that it is possible to ascertain if a building is attacked; fresh emergence holes, fresh pellets are danger signals; secondly, that treatment is not usually expensive, unless matters have gone so far as to necessitate structural repairs.

W. P. STEEL.

ALLIED SOCIETIES.

Mr. CLEMENT STRETTON, F.R.I.B.A., who has served the Leicester and Leicestershire Society of Architects as honorary secretary for the past fifteen years, has been succeeded in that office by Mr. C. F. McL. Keay, of 6 Millstone Lane, Leicester.

Labour Problems in the Building Industry

At an ordinary general meeting of the Architectural Association, held on Monday, 27 April, an address on "Labour Problems in the Building Industry" was delivered by Mr. R. Coppock, the general secretary of the National Federation of Building Trades Operatives. The chair was occupied by the President of the Association, Mr. H. S. Goodhart-Rendel.

Mr. Coppock referred to the conditions of the building industry prior to 1914, which were, he said, the worst conditions of any craft industry existent in Great Britain; and when it was now said that the building operatives were taking the cream of the industry because their wages were equivalent to a rise of 125 to 130 per cent. above pre-war rates, it must be understood that their pre-war rates had not been equal to the cost of living.

To-day, according to some sections of the Press, the building trade operative was the only person who was responsible for the shortage of houses in Great Britain, and the bricklayer particularly. That was quite false. As far as the operatives were concerned, they were prepared to use the whole of their machinery if the Government was prepared to go on with a continuity programme that would provide the people with housing accommodation; but they contended that the Weir house was the worst type of steel house that was on the British market to-day. It was not a steel house, it was a timber house. The inner lining was such that in a few years it would be entirely insanitary. The building operatives had no objection as an industry to any type of house being built. It mattered very little to them what class of house the local authorities bought for their people, provided always that the trade union conditions operated for the men who were employed to work upon these houses. With regard to hours of labour, he knew that in his office he could get better work by working his staff 38 rather than 48 hours a week. If people would only get away from the idea that the only method to make everything productive was to work a lot of hours it would be better for them. In the most progressive countries of the world they had a short working week. Here in this country he had heard architects and builders say they wanted to get back to the good old times. They did not mean it. They did not want to go back to the good old times, but they wanted the operatives to do so. He wanted to see a forward movement, and he believed that one of the defects in the building trade to-day was the attempt on all sides to extend the working week. It would be a disaster. It would upset the general relations of the industries.

He was a bricklayer, and in his best times his average wage was £1 7s. 6d. per week. It should be realised that the operatives' claim for a "wet" time was a real claim and one which had been long due for the men working in the industry. Architects would not think of stopping their assistants' pay because it was raining outside, and yet operatives had to stand down when the weather was wet or through shortage of material or because the wrong material had been sent or for some other reason. Surely the operatives had some claim for a "wet" time allowance. He hoped they would progress in the same way that other nations were progressing. In Holland to-day 70 per cent. of lost time was granted to workers in the building trade. In Germany things were so unstable that their national agreement had gone by the board, but it was part and parcel of their national programme that there should be payment for "wet" time. In Sweden, Norway and Denmark they paid 70 to 80 per cent. This was one of our biggest problems, but operatives in this country should be assured of some payment for "wet" times. On the question of apprentices, the operatives' association had endeavoured to come to an agreement with the builders of the country. They had insisted that the boys should have proper training and they had also insisted that they should have control over the boys' wages. They had agreed with their builder friends to train the boys and youths

and adult men on housing schemes, to take labourers from the ranks and to put them through a course of training. The boy had a right to choose his trade, but too many had chosen to be joiners or plumbers or painters when there was a scarcity of plasterers or stonemasons, and therefore the operatives' society claimed the right to say that some of those boys should be bricklayers or plasterers so as to balance the industry. What they were suffering from at the present moment was the lack of balance of the crafts due entirely to the haphazard employment of apprentices.

Mr. Alan Slater proposed a vote of thanks to Mr. Coppock for his address. With regard to the question of "wet" times, he thought Mr. Coppock might assure himself that architects as a body were heartily with him. It was outrageously unfair that a man should go on a job and if it began to rain be told to knock off, so that he had to go away without any money in his pocket. It had been suggested that there should be a wages adjustment fund to meet such a thing as this, and one builder in London had adopted such a scheme with success. He hoped other builders would seriously consider the matter. Another point was the question of the possibility of the grading of trades. In certain of the most skilled trades grading had actually taken place with very good results, and it would be a good thing to give men an opportunity to rise in their own industry. On the question of apprentices it had been said that it was the trades unions who limited the number. There certainly had been a shortage of apprentices in certain cases. As to taking in men of 30 and 40 years of age, the architects did not favour that, but they did want men of 25 or 26 to be taken in after the war because there were many men of that age who came out of the Army who had had no opportunity of learning a trade and who wanted a chance of learning one. With regard to the problem of keeping contracts which had been agreed to between employers and employed, he understood it was agreed that when summer time came in the men were going to work 46½ hours per week, but they had not done so. That was one of the things that told against the operatives.

Mr. Manning Robertson seconded the vote of thanks.

The resolution was put to the meeting and carried unanimously.

Mr. G. Hicks, secretary of the National Federation of Building Trades Operatives, said with regard to "wet" times that there should be some sort of fund to meet a matter of this kind over which the workman had no control. He spoke as a bricklayer, and there was a great feeling amongst their members to-day that something should be done to meet the men's claim for lost time. They were only asking 50 per cent. for lost time, because they knew that if men got as much money for sitting down and doing nothing as they would if they were working, they would not work at all. The idea of losing 50 per cent. of their wages would be sufficient to get the workmen to go on with their job as soon as the weather would enable them to do so. Then again, millions of hours of labour were lost because there was bad organisation. What they wanted was a continuity of work, and he was sure that could be arranged with a little organisation. Every municipality in this country should be compelled to state its requirements in housing for the following year, and then some idea would be obtained as to the volume of building material that would be required. Suppose they fixed the number of houses at 200,000 a year. If the building requirements for commercial work, for schools, hospitals and other large buildings were large in the first year, the number of houses for the next year could be reduced to 150,000, and if the commercial and other requirements became less the number of houses for the third year could be increased to 250,000. That would give stability in the

industry and they could take people into the industry in sufficient volume to meet all requirements. But the position now was one of great uncertainty. They wanted some sort of reasonable guarantee. On the question of materials it was true that the whole of the building materials were used up every week. There was no surplus, and it was useless to talk of bringing more people into the industry until they brought in sufficient material for them to use. The operatives had the right to demand a living wage. People had a right to live in houses, but they had no right to ask operatives to build those houses for 50s. a week. They had the right to ask for and were going to ask for more and more control in the building industry. They were willing to allow 100,000 apprentices in their industry at once providing they had the material coming in.

Mr. J. Murrey (Secretary of the London District of the National Federation of Building Trades' Operatives) referred to the necessity for the development of craftsmanship. He wondered how often it occurred to the critic of the building operatives that the latter were the last factors in the cost of the building. The first person who was responsible was the building owner. He very often did not know what he wanted until he saw the building go up and then he wanted alterations made which did not conduce to the best spirit in the operative. Very often the builder had to stop his men because there were delays in supplies of material. If the best results were to be got from a man he must be given the greatest facilities to get on with his work and he must not be restricted. He must have his building material. With regard to the necessity for apprentices it might be interesting for them to know that in his own trade, that of a stonemason, in 1919-1920 there were only about 70 apprentices as against 1,800 operatives in the London district, and there was a rule in operation for one in seven to be employed. With one or two exceptions no employer had taken his quota of apprentices, and at the present moment they had hundreds of boys scheduled and waiting to come into the trade. Before the war an employer could recruit his labour from the provinces, but that channel was now stopped. He was certain that it would be some years before the master builders in London had got a sufficient quota of apprentices to meet the requirements of the industry. He was surprised to find employers opposing them in their claim that the boys should have technical training as a part of their apprenticeship. With the present-day need for skilled men that could hardly be credited.

Mr. Coppock replied to the vote of thanks. He said they contended that there should be a minimum rate of wages paid in all grades and they had never objected to a man paying more than that grade to any person who he thought was worth it. Regarding the question of apprenticeship, he agreed that the employers had never taken up to the limit. The difficulty of having apprentices was that the employers had never attempted to train them; the men on the job always did that. With regard to keeping contracts, the building operatives had done so as far as they could under the circumstances. Regarding the shortage of output, 20,000 bricklayers laid a considerably larger number of bricks last year than the same number did in 1914.

A.B.S. SCHEME OF PROFESSIONAL INSURANCE.

Insurance to-day is a very complicated business and too much care cannot be exercised in the choice of an insurance company and of a policy. If, however, architects consult the Insurance Committee of the Architects' Benevolent Society, they are sure of obtaining competent guidance in all insurance matters. Especially favourable terms are secured by the Society, and every insurance negotiated through its agency results in a direct contribution to the Benevolent Fund. Enquiries should be addressed to the Secretary, A.B.S., 9 Conduit Street, W

NOTES FROM THE MINUTES OF THE COUNCIL MEETING.

20 April 1925.

THE INSTITUTION OF MUNICIPAL AND COUNTY ENGINEERS.

In response to an invitation from the Institution of Municipal and County Engineers, the following gentlemen were appointed to represent the R.I.B.A. at a round table conference on Town Planning:—

Professor Patrick Abercrombie,
Major Harry Barnes,
Mr. L. H. Bucknell,
Mr. F. M. Elgood,
Mr. Percival M. Fraser,
Mr. Herbert Shepherd,
Mr. W. Harding Thompson.

THE GENERAL COUNCIL FOR THE NATIONAL REGISTRATION OF PLUMBERS.

Mr. Arthur J. Hope, President, Manchester Society of Architects, was appointed to represent the R.I.B.A. at a meeting of the General Council for the National Registration of Plumbers in Manchester on 18 June 1925.

THE R.I.B.A. AND THE SOCIETY OF ARCHITECTS.

The Secretary reported that the numbers of members of the Society of Architects who had transferred to the R.I.B.A. to date under the amalgamation agreement were as follows:—

Fellows	..	..	205
Members	..	..	822
Licentiatees	..	..	238
Students	..	..	84
Hon. Members	..	..	5
Retired Members	..	..	35

THE REGISTRATION BILL.

The Registration Committee, having reported that the preparation of the Draft Registration Bill was nearing completion, were empowered to consult counsel on the matter.

REINSTATEMENT.

Mr. W. Leonard Dowton was reinstated as a Licentiate.

RESIGNATIONS.

The following resignations were accepted with regret:

William Davidson [L.]
W. W. Longbottom [L.]

FRANCO-BRITISH UNION OF ARCHITECTS.

FIFTH GENERAL MEETING. PARIS PRELIMINARY PROGRAMME.

23 May.—Opening meeting at the Pavilion of the S.A.D.G. in the "Exposition des Arts Decoratifs." Visit to the Exhibition, and general meeting in the Pavilion.

24 May.—Excursion to the Abbaye de Chaalis Ermenonville and Chantilly.

25 May.—Visit to the Salon des Artistes Français, and reception at the Maison des Artistes. Evening: Banquet offered to the British delegates.

ATTENDANCES AT COUNCIL AND STANDING COMMITTEE MEETINGS, 1924-25.

COUNCIL (16 Meetings).

President: J. Alfred Gotch, 16. *Vice-Presidents*: Major Harry Barnes, 14; Herbert T. Buckland, 10; E. Guy Dawber, 14; Sir Edwin L. Lutyens, 2. *Past Presidents*: Sir Reginald Blomfield, 0; Paul Waterhouse (deceased), 0. *Hon. Secretary*: Arthur Keen, 16.

Members of Council: Professor S. D. Adshead, 4; Henry V. Ashley, 15; Sir John J. Burnet, 4; Walter Cave, 14; Major H. C. Corlette, 15; Sir Banister Fletcher, 11; Henry M. Fletcher, 14; W. Curtis Green, 9; Francis Jones, 9; John Keppie, 3; H. V. Lanchester, 4; E. C. P. Monson, 13; T. Taliesin Rees, 6; Edwin J. Sadgrove, 10; Sir Giles Gilbert Scott, 0; Sir A. Brumwell Thomas, 12; Percy E. Thomas, 10; Francis T. Verity, 9.

Associate Members of Council: Hope Bagenal, 7; H. Chalton Bradshaw, 14; Leonard H. Bucknell, 16; Professor Lionel B. Budden, 8; J. Alan Slater, 14; Michael Waterhouse, 9.

Representatives of Allied Societies: J. Stockdale Harrison (Leicester), 6; Arthur J. Hope (Manchester), 9; W. T. Jones (Northern), 5; E. Bertram Kirby (Liverpool), 11; G. C. Lawrence (Wessex), 13; George A. Paterson (Glasgow), 0; H. L. Paterson (Sheffield), 10; Edward P. Warren (Berks, Bucks and Oxon), 14; Robert M. Young (Ulster), 1.

Representative of the Architectural Association: H. S. Goodhart-Rendel, 9.

STANDING COMMITTEES.

Art (7 meetings).—*Fellows*: Professor S. D. Adshead, 2; Sir John J. Burnet, 2; Walter Cave, 5; E. Guy Dawber, 2; H. Austen Hall, 0; H. V. Lanchester, 0; F. Winton Newman, 6; Halsey Ricardo, 4; Sir Giles Gilbert Scott, 0; Professor F. M. Simpson, 3. *Associates*: Leonard H. Bucknell, 6; Cyril A. Farey, 1; P. W. Lovell, 0; T. S. Tait, 0; W. Harding Thompson, 4; Michael Waterhouse, 0. *Appointed by Council*: Heaton Comyn, 6; H. P. Burke Downing, 6; Walter Tapper, 3; Francis T. Verity, 4; Maurice E. Webb, 3.

Literature (8 meetings).—*Fellows*: Louis Ambler, 7; W. H. Ansell, 3; Martin S. Briggs, 4; Major H. C. Corlette, 7; Henry M. Fletcher, 2; D. Theodore Fyfe, 3; E. Stanley Hall, 0; Charles S. Spooner, 4; Arthur Stratton, 3; C. Harrison Townsend, 4. *Associates*: H. Chalton Bradshaw, 5; C. Cowles-Voysey, 4; A. Trystan Edwards, 1; P. W. Hubbard, 4; J. Alan Slater, 8; Professor J. Hubert Worthington, 1. *Appointed by Council*: Professor Lionel B. Budden, 1; A. H. Moberly, 7; Basil Oliver,* 7; S. C. Ramsey, 3; C. E. Sayer, 6.

Practice (9 meetings).—*Fellows*: Henry V. Ashley, 9; F. Chatterton, 8; Max Clarke, 7; G. Hastwell Grayson, 5; Francis Jones, 4; Arthur Keen, 3; G. H. Lovegrove, 8; T. R. Milburn, 1; D. Barclay Niven, 8; W. Gillbee Scott, 2. *Associates*: Horace Cubitt, 7; G. Leonard Elkington, 6; H. V. Milnes Emerson, 6; J. Douglas Scott, 9; Herbert A. Welch, 7; Charles Woodward, 9. *Appointed by Council*: W. H. Atkin-Berry, 9;

C. A. Daubney, 5; Delissa Joseph, 7; E. C. P. Monson, 8; Harry Teather, 6.

Science (8 meetings).—*Fellows*: R. Stephen Ayling, 4; Herbert T. Buckland, 0; W. E. Vernon Crompton, 8; J. E. Dixon-Spain, 0; Alan E. Munby, 3; William A. Pite, 5; H. D. Searles-Wood, 5; Professor R. Elsey-Smith, 3; Digby L. Solomon, 4; Dr. Raymond Unwin, 2. *Associates*: R. J. Angel, 3; Hope Bagenal, 6; P. W. Barnett, 5; H. W. Burrows, 2; T. F. Ford, 1; Harvey R. Sayer, 6. *Appointed by Council*: T. P. Bennett, 4; J. Ernest Franck, 7; Francis Hooper, 4; J. H. Markham, 3; Edwin J. Sadgrove, 2.

THE ANNUAL ELECTIONS.

NEW NOMINATIONS TO COUNCIL AND STANDING COMMITTEES.

The following nominations have been made by members in accordance with Bye-Law 36:—

As Vice-President.—Downing: Henry Philip Burke [F.].

As Members of Council.—Joseph: Delissa [F.]; Reilly: Professor Charles Herbert [F.] (Liverpool); Searles-Wood: Herbert Duncan [F.]; Welch: Herbert Arthur [F.].

As Associate Members of Council.—Cart de Lafontaine: Lt.-Col. H. P. L. [A.]; Heaven: Frank Henry [A.] (Cardiff); Howitt: Major Thomas Cecil [A.] (Nottingham).

As Licentiate Member of Council.—Reeves: Augustus Seymour [L.].

As Associate Members of the Practice Standing Committee.—Hamlyn: William Henry [A.]; Jelley: Frederick Richard [A.]; Sturgeon: John Henry [A.].

As Licentiate Members of the Practice Standing Committee.—Denington: Joseph William [L.]; Reeves: Augustus Seymour [L.].

Notices

THE FOURTEENTH GENERAL MEETING.

The Fourteenth General Meeting (Ordinary) of the Session 1924-25 will be held on Monday, 18 May 1925, at 8 p.m., for the following purposes:

To read the Minutes of the Annual General Meeting held on 4 May 1925; formally to admit members attending for the first time since their transfer or election.

To read the following paper: "The Architectural Development of American Cities," by Mr. G. Topham Forrest (F.), architect to the London County Council.

VISIT TO HAM HOUSE, RICHMOND.

By the kind permission of the Earl of Dysart a visit to Ham House, Richmond, Surrey, has been arranged by the Art Standing Committee to take place on Saturday afternoon, 16 May. As the number of tickets to be issued for the visit must be limited, members who wish to take part are requested to apply as early as possible to the Secretary, R.I.B.A., 9, Conduit Street, London, W.1.

THE R.I.B.A. CHARTERS AND BYE-LAWS.

The attention of members is directed to the pamphlet, enclosed with this issue of the JOURNAL, containing the Supplemental Charter of 1925 and the revised Bye-laws of the Royal Institute recently approved by the Privy Council.

* Mr. Oliver's name was inadvertently omitted from the Literature Committee's Report published in the last issue of the JOURNAL.

NOTICES (continued)

THE R.I.B.A. ANNUAL CONFERENCE

NEWCASTLE AND DURHAM.

8 TO 11 JULY 1925.

Members of the R.I.B.A. and Allied Societies who propose attending the Conference are reminded of the following railway travelling facilities that are available.

From London to Durham a tourist ticket is issued, available for two months and with facilities for breaking the journey at all important points, for 58s. 3d. (3rd class).

From London to Newcastle the ordinary return fare is 67s. 10d.; but members could take a tourist ticket to Whitley Bay for 68s., enabling them to break their journey at Newcastle either going or returning, and by which they can, if desired, go on to the coast at any time within the period of two months.

Mr. Alfred Myers, railway agent, of 343, Gray's Inn Road, London, W.C., will be pleased to advise members who propose travelling from London and other centres, and also to issue tickets and book seats on application to him.

THE CITY CHURCHES.

It is proposed to arrange in the R.I.B.A. Galleries an Exhibition of Drawings and photographs of the Churches in the City of London from 5 to 13 June 1925.

The Committee in charge of the arrangements would be glad to receive from members the loan of any drawings suitable for exhibition. Drawings so lent will be insured and returned, carriage paid.

R.I.B.A. LECTURE, 18 MAY 1925.

Mrs. Arthur Strong, Assistant Director of the British School at Rome, is unavoidably prevented from delivering her lecture on 18 May.

Mr. G. Topham Forrest, F.R.I.B.A., the architect to the London County Council, has kindly consented to deliver a lecture on "The Architectural Development of American Cities" on the vacant date.

Mr. Forrest's lecture will be largely based upon his observations during his recent tour in the most important cities of the United States on behalf of the London County Council. He has brought back with him a great deal of most interesting and important information with regard to architectural methods and building practice, and his lecture on 18 May will be the first occasion upon which these results will be communicated to the profession and the public generally.

COMMISSION FOR INTRODUCTION OF BUSINESS.

The Practice Standing Committee having brought to the notice of the Council that certain firms of auctioneers and estate agents are demanding commissions from architects for the introduction of business, the Council desire to notify members that they must not accept any work which involves the giving or receiving of discounts or com-

missions, as by so doing they would be deemed guilty of unprofessional conduct and become liable under the by-laws to reprimand, suspension or expulsion.

Competitions

CONCRETE COTTAGE PRIZES.

MINISTRY'S CONDITIONS FOR "SHUTTERING" COMPETITION.

In view of an erroneous statement which has appeared in the Press that the Ministry of Health are offering a prize of £500 for the best system of "shuttering" suitable for the construction of concrete cottages, an official of the Ministry to-day (Thursday) said that the prize would be only £250. A further sum of £250 might be distributed in additional prizes, but this would be at the discretion of the Committee on New Methods of House Construction.

In adjudging the "shuttering," special consideration will be given to the following points: Economy; a satisfactory finish on the faces of the wall; the ease with which the "shuttering" can be handled by unskilled men; durability; facility for use with different designs of cottages; and adaptability for use with cavity walls.

Competitors are first required to send in drawings and descriptions, to reach the Ministry of Health not later than 31 May. From these proposals the Committee will select the most promising and call upon the proposers of these to submit samples of their "shuttering." Before the final selection is made, the methods will probably be subjected to tests under working conditions.

It is understood that the inventions submitted will be exhibited in the Housing Section at Wembley.

CAERPHILLY WAR MEMORIAL COMPETITION.

The Competitions Committee desire to call the attention of Members to the fact that the conditions of the above competitions are not in accordance with the Regulations of the R.I.B.A. The Competitions Committee are in negotiation with the promoters in the hope of securing an amendment. In the meantime Members are advised to take no part in the above competitions.

BOROUGH OF GRAVESEND.

NEW DIPHTHERIA BLOCK.

Members of the Royal Institute of British Architects must not take part in the above competition because the conditions are not in accordance with the published Regulations of the Royal Institute for Architectural Competitions

ASHFORD U.D.C. COMPETITION.
ASSEMBLY ROOM CONVERSION.

The Competitions Committee desire to call the attention of Members to the fact that the conditions of the above competition are not in accordance with the Regulations of the R.I.B.A. The Competitions Committee are in negotiation with the promoters in the hope of securing an amendment. In the meantime Members are advised to take no part in the competition.

COMPETITIONS (continued)

PROPOSED REBUILDING OF THE ENGLISH BAPTIST CHURCH, PONTLOTTYN.

The Competitions Committee desire to call the attention of members to the fact that the conditions of the above competition are not in accordance with the regulations of the R.I.B.A. The Competitions Committee are in negotiation with the promoters in the hope of securing an amendment. In the meantime Members are advised to take no part in the competition.

NATIONAL COMMEMORATIVE WAR MONUMENT.

To be erected on Connaught Place, Ottawa, Canada. Closing date for receiving designs, 11 June 1925. Assessors Henry Sproatt, LL.D., R.C.A., Herman A. MacNeil, N.A., F. J. Shepherd, M.D., C.M., LL.D. Total cost not to exceed \$100,000. Apply to the Secretary, Department of Public Works, Ottawa, Canada.

CHEAM PRESBYTERIAN CHURCH COMPETITION.

Members of the Royal Institute of British Architects must not take part in the above competition, because the conditions are not in accordance with the published Regulations of the Royal Institute for Architectural Competitions.

PROPOSED EXTENSION TO THE SHIREHOUSE, NORWICH.

Closing date for receiving designs 1 July 1925. Assessor, Mr. Godfrey Pinkerton, F.R.I.B.A. Premiums £150, £100, and £50. Apply to the Clerk of the County Council, Shire Hall, Norwich.

COMPETITION FOR A HIGH BRIDGE OVER COPENHAGEN HARBOUR.

Copenhagen Municipality hereby invite participation in an International Competition in connection with a High Bridge over Copenhagen Harbour.

The Municipality have set apart a sum of 35,000 kroner to be expended in prizes. There will be three prizes, the value of which will be fixed by a Judgment Committee consisting of Members of the Council, together with technicians chosen by the Municipality, the (Danish) Institute of Civil Engineers and the (Danish) Society of Architects. The largest prize will be at least 15,000 kroner.

Programme and particulars in Danish and English can be procured after 1 February 1925, from the City Engineer's Office, Town Hall, Copenhagen B, against a deposit of kr. 100.

The deposit is repayable after the judging, or previously if the drawings, particulars, etc., are returned in good condition. Projects to be delivered to the City Engineers Directorate, Town Hall, before mid-day, 1 September 1925.

After judgment the competing projects will be publicly exhibited at the Town Hall, Copenhagen.

LEAGUE OF NATIONS.

COMPETITION FOR THE SELECTION OF A PLAN WITH A VIEW TO THE CONSTRUCTION OF A CONFERENCE HALL FOR THE LEAGUE OF NATIONS AT GENEVA.

The League of Nations will shortly hold a competition for the selection of a plan with a view to the construction of a Conference Hall at Geneva. The competition will be open to architects who are nationals of States Members of the League of Nations.

An International Jury consisting of well-known architects will examine the plans submitted and decide their order of merit.

A sum of 100,000 Swiss francs will be placed at the disposal of the Jury to be divided among the architects submitting the best plans.

A programme of the competition will be ready in February, 1925, and will be despatched from Geneva so that Governments and competitors may receive copies at approximately the same date. Copies for distant countries will therefore be despatched first.

The British Government will receive a certain number of free copies. These will be deposited at the Royal Institute of British Architects, and application should be made to the Secretary, R.I.B.A., 9, Conduit Street, W.1, by intending competitors.

Single copies can be procured direct from The Secretary-General of the League of Nations at Geneva, for the sum of 20 Swiss francs, payable in advance, but will not be forwarded until after the Government copies have been despatched.

On the nomination of the President of the Royal Institute, Sir John Burnet, A.R.A., has been appointed as the British representative on the Jury of assessors.

TECHNICAL COLLEGE, MIDDLESBROUGH.

The conditions of the above Competition have been submitted to the Competitions Committee of the R.I.B.A., and are found to be in accordance with the Regulations of the R.I.B.A.

THE NEW INSTITUTE FOR THE BLIND, BUENOS AIRES, ARGENTINE REPUBLIC.

An International Competition has been promoted for the Argentine Institution for the Blind, Buenos Aires, Argentine Republic.

A small number of copies of the Conditions have been deposited in the R.I.B.A. Library for the information of British Architects who may desire to compete.

A booklet containing the full text of the conditions with other information (translated from the Spanish) and a plan of the ground on which the Institution is to be erected is available for inspection at the Department of Overseas Trade (Room 42), 35 Old Queen Street, London, S.W.1.

COALVILLE PUBLIC BATHS COMPETITION.

The President of the Royal Institute of British Architects has nominated Mr. Alfred W. S. Cross, F.R.I.B.A., as assessor in this competition.

Members' Column

PARTNERSHIP WANTED.

A.R.I.B.A., age 32, Articled Pupil and A.A. School Training, experience with Provincial and Leading London Architect, requires partnership. Capital.—Apply Box 9525, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

APPOINTMENTS VACANT.

THE Government of Ceylon are in need of three temporary Architectural Assistants for the Public Works Department of that Colony. The particulars of these posts are as follows:—

M/13532. Senior Temporary Architectural Assistant. Salary £1,000 a year. Two years' service on agreement. Qualifications as follows: Age 28-35. Must have passed full examination for Associateship of the Royal Institute of British Architects. Must have been trained in a recognised School of Architecture named in the R.I.B.A. *Kalendar*. Preferably have had previous experience in the design of University or Scholastic buildings.

M/13520-2 (two appointments). Temporary Architectural Assistant. Three years' service on agreement. Salary £500, rising to £500 by annual increments of £30. Three years' service. Age 25-30. Must have passed the full examination for Associateship of the Royal Institute of British Architects.

The persons appointed will receive Colombo rent allowance amounting to 7½ per cent. of salary for a bachelor or 15 per cent. if married. In case Government quarters are provided the occupier will forgo his station allowance and pay 10 per cent. of his salary as rent. Free passages will be provided to and from Ceylon for the persons selected and, if married, for their wives and children.

Applications for the position should be addressed to M/13530, The Crown Agents for the Colonies, 4 Millbank, Westminster, London, S.W.1.

ARCHITECT'S ASSISTANT required by Nottingham architect. Should have sound knowledge of construction and be able to take off quantities. State age, experience and salary required.—Apply Box 2745, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

A FIRST-CLASS ASSISTANT is required in a London Architect's office. An intimate knowledge of the constructional details of schools is essential.—Apply, stating experience, to Box 7525, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

CHANGES OF ADDRESS.

MESSRS. KNAPP-FISHER, POWELL AND RUSSELL have moved from 133 Ebury Street to 4A Lower Belgrave Street, S.W.1. Victoria 5082.

MR. F. MILTON HARVEY [A.] has changed his office address from 7 King Street, Cheapside, E.C.2, to 8 Broad Court Chambers, Bow Street, Covent Garden, W.C.2. Telephone No.: Regent 4008.

MESSRS. HENDRY AND SCHOOLING, Architects, have moved their offices to 53 Doughty Street, W.C.1. Telephone Number: Museum 7308.

ACCOMMODATION OFFERED.

PRESENT TENANTS (Architects) are moving to larger offices on 24 June. Accommodation. Two Rooms, one of which has separate entrance. Half share of lighting, heating, etc. Rent, £110 per annum.—Reply Box 7575, c/o The Secretary R.I.B.A., 9 Conduit Street, W.C.

F.R.I.B.A. has ground floor offices to let in good position in Westminster.—Apply Box 3045, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

SUSSEX.—Member offers Board-Residence in old Farm House in district full of old churches and half-timber houses. Electric light, bath, telephone, part use of motor-car. Advice given to students on measured drawings.—Apply to Box 1345, c/o The Secretary, R.I.B.A., 9, Conduit Street, London, W.C.

MR. HOWARD D. ARCHER.

MR. HOWARD D. ARCHER [A.] has opened an office in York House, Government Road, Nairobi, Kenya Colony. Postal address, P.O. Box 55, Nairobi, Kenya Colony, at which address he will be pleased to receive trade catalogues.

MR. OLIVER GAUNT.

MR. OLIVER GAUNT, Associate of the Royal Institute of British Architects, has retired from the State Buildings Department of the Egyptian Government and has opened an office at No. 4 Midan Suares, Cairo. He will be glad to receive merchants' catalogues, etc.

MESSRS. NORRIS AND SHATTOCK.

MESSRS. NORRIS AND SHATTOCK, L. and A. R.I.B.A., of 51 High Street, Guildford, and 16 Church Street, Godalming, have recently opened an office at 26 Buckingham Gate. Telephone No.: Victoria 2181.

SECRETARY AND ACCOUNTANT RECOMMENDED.

F.R.I.B.A. strongly recommends a Secretary and Accountant, specially trained in architects' offices, who is desirous of taking a similar post.—Apply Box 2635, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

APPOINTMENTS WANTED.

A.R.I.B.A. with small practice desires temporary post to assist Architect on or near the South Coast during June and July.—Apply Box 6525, c/o The Secretary R.I.B.A., 9 Conduit Street, W.C.

ASSOCIATE is prepared to give assistance to Architects with sketches, working drawings, details, specifications, surveys, etc., at own office or otherwise. Moderate terms. Local knowledge of Kent and Sussex districts.—Apply Box 8525, c/o The Secretary R.I.B.A., 9 Conduit Street, London, W.C.

OFFICE ACCOMMODATION WANTED.

A.R.I.B.A. requires light offices, or would consider sharing suite, Westminster or West district. Please state full particulars with inclusive terms. Box 1011, c/o Secretary R.I.B.A., 9 Conduit Street, W.C.

Minutes XIII

SESSION 1924-1925.

At the Annual General Meeting (being the Thirteenth General Meeting of the Session 1924-1925), held on Monday, 4 May 1925, at 8 p.m., Mr. J. A. Gotch, President, in the Chair. The attendance book was signed by 24 Fellows (including 11 members of the Council), 14 Associates (including 2 members of the Council), and 7 Licentiates. The Minutes of the general meeting held on 20 April 1925 having been published in the JOURNAL, were taken as read, confirmed and signed by the Chairman.

The Hon. Secretary announced the decease of the following members:—

Mr. Louis Alfred Westwick, elected Fellow 1906.

Mr. Oswald Cane Wylson, elected Associate 1880, Fellow 1888.

Mr. Frank Protheroe, elected Associate 1881.

On the motion of the Hon. Secretary it was Resolved that the regrets of the Institute for the loss of these members be recorded on the Minutes of the meeting, and that a message of sympathy and condolence be conveyed to their relatives.

The following members attending for the first time since their election or transfer were formally admitted by the President:—

Messrs. F. H. Greenaway [F], J. E. Newberry [F], S. V. Bradford [A], G. W. Ferguson [L], F. H. Waple [L], and H. A. Wilkinson [L].

The Secretary announced that the Council had nominated for election to the various classes of membership the persons whose names were published in the JOURNAL for 4 April 1925.

The Chairman formally presented the Report of the Council and the Standing Committees for the official year 1924-1925, and stated that the Chairmen or other representatives of each of the Committees, whose reports were appended to the Council's Report, had been asked to attend the meeting so as to be in a position to answer any questions that might be asked in connection with their reports.

The Chairman having moved the adoption of the Report and invited discussion upon it, the Hon. Secretary seconded the motion, and a discussion ensued, in which Mr. William Woodward [F.] took part.

The motion having been put from the Chair, it was unanimously Resolved that the Report of the Council and the Standing Committees for the official year 1924-1925 be approved and adopted.

The Chairman stated that the list of attendances at the Council and Standing Committee meetings had been laid on the table and would be printed in the next issue of the JOURNAL.

Upon the motion of the Chairman, seconded by the Hon. Secretary, a vote of thanks was passed by acclamation to Mr. R. Stephen Ayling [F.] and Mr. C. E. Hutchinson [A.] for their services as Hon. Auditors for the past year. Mr. A. H. Goslett [F.] and Mr. F. J. Toop [A.] were nominated as Hon. Auditors for the ensuing year of office.

The proceedings closed at 8.55 p.m.

BUSINESS MEETING 8 JUNE 1925.

An election of members will take place at the Business General Meeting, 8 June. The names and addresses of the candidates (with the names of their proposers) found by the Council to be eligible and qualified for membership according to the Charter and Bye-laws and recommended by them for election, are as follows:—

AS FELLOWS (14).

ADAMS: PERCY TIDSWELL [A. 1909], Imperial Bank Building, Prince Street, Colombo, Ceylon. Proposed by Austin Woodeson, Herbert Wigglesworth, Arthur W. Kenyon.

BEST: HALSTEAD [A. 1925], St. John's Chambers, 87, Church Street, Blackpool; 46, Read's Avenue, Blackpool. Proposed by the Council.

DUNN: HERBERT HENRY [A. 1896], County Hall, Cambridge; The Woodlands, Great Shelford, Cambs. Proposed by A. Paul MacAlister, W. G. Watkins, Henry G. Gamble.

GLENCROSS: LESLIE HAROLD [A. 1919], 2 John Street, Bedford Row, W.C.; "Bostraze," Hill Close, Harrow-on-the-Hill. Proposed by David Barclay Niven, Maxwell Ayrton, Dr. Raymond Unwin.

GUTHRIE: LEONARD ROMIE, M.C., M.R.I. [A. 1910], 37 Bruton Street, W.1; 3 Caithness Road, Brook Green, W. Proposed by Edward Warren, James S. Gibson, W. Curtis Green.

HOBSON: CAPTAIN JOSEPH REGINALD, M.C. [A. 1907], Public Works Department, Southern Rhodesia; Salisbury Club, Salisbury, Rhodesia. Proposed by Granville E. S. Streetfield, Wilfrid Travers, Arthur T. Bolton.

HOLT: HAROLD GUY [A. 1908], Windsor House, 46 Victoria Street, Westminster, S.W.1; 9 Sutton Court, Chiswick, W.4. Proposed by L. Sylvester Sullivan, George A. Lansdown, Frederick Chatterton.

SWANNELL: CHARLES MALCOLM [A. 1911], 1 Broad Street Buildings, Liverpool Street, E.C.2; 48 Alexandra Park Road, Muswell Hill, N. Proposed by Alfred Cox, W. Gillbee Scott, Fredk. Ernest Williams.

THOMPSON: MORRIS [A. 1910], Carbon Chambers, Hall Gate, Doncaster; Bawtry Road, Doncaster. Proposed by P. A. Hinchliffe, Jno. Stuart, Alexander G. Bond.

TRENCH: GILBERT MACKENZIE, F.S.I. [A. 1908], Police Architect and Surveyor, New Scotland Yard, S.W.1; "Grassington," Foxley Lane, Purley, Surrey. Proposed by Percival M. Fraser, Dr. Raymond Unwin, Jno. Stuart.

WALKER: EDWARD HOLSWORTH [A. 1906], Carbon Chambers, Hall Gate, Doncaster; "Sandilands," Bessaca, near Doncaster. Proposed by P. A. Hinchliffe, Keith D. Young, Stephen Shaw.

WALKER: MARSHALL EYRE [A. 1911], 21 Suffolk Street, Pall Mall East, S.W.1; Uddene, West Hill Road, Woking, Surrey. Proposed by James Ransome, Wm. H. Atkin-Berry, Martin S. Briggs.

WARD: BERNARD MICHAEL [A. 1906], 3 Lord Street, Liverpool; 88 Upton Road, Birkenhead. Proposed by Gilbert Fraser, E. Bertram Kirby, Hastwell Grayson.

WELCH: ROLAND [A. 1908], 20 and 22 Maddox Street, W.1; 12 Constable Close, Hampstead Garden Suburb, N.W.11. Proposed by Chas. H. Gage, Wm. Woodward, A. H. Kersey.

AS ASSOCIATES (5).

ASHBURNER: EDWARD HEATHCOTT, B.Arch. Liverpool [*Passed five years' course at Liverpool University School of Architecture—Exempted from Final Examination after passing Examination in Professional Practice*], 5 Fairfield Road, Stockton Heath, Warrington. Proposed by Professor C. H. Reilly, S. Segar-Owen, Geoffrey Owen.

BLOODWORTH: CHARLES THOMAS, B.Arch. Liverpool [*Passed five years' course at Liverpool University School of Architecture—Exempted from Final Examination after passing Examination in Professional Practice*], 138 Derby Lane, Stoneycroft, Liverpool. Proposed by Professor C. H. Reilly, W. B. Simpson, Edmund Wimperis.

JENKINS: WILLIAM VICTOR, B.Arch. Liverpool [*Passed five years' course at Liverpool University School of Architecture—Exempted from Final Examination after passing Examination in Professional Practice*], 20 Manville Road, Wallasey, Cheshire. Proposed by Professor C. H. Reilly, Edgar Quiggin and the Council.

MAW: SAMUEL HERBERT [*Final Examination*], 274 Beaver Hall Hill, Montreal, Canada. Proposed by Philip J. Turner, Geo. A. Ross, Percy E. Nobbs.

VELARDE: FRANCIS XAVIER [*Passed five years' course at Liverpool University School of Architecture—Exempted from Final Examination after passing Examination in Professional Practice*], 16 Withert Avenue, Higher Bebington, Cheshire. Proposed by Professor C. H. Reilly and the Council.

AS HON. ASSOCIATES (4).

DEARMER: THE REV. PERCY, M.A., D.D., Professor of Ecclesiastical Art and Lecturer in Art, King's College, University of London; 9 Embankment Gardens, Chelsea, S.W.3. Proposed by the Council.

EARLE: SIR LIONEL, K.C.B., K.C.V.O., C.M.G., J.P., 14 Sloane Gardens, S.W. Proposed by the Council.

SHAW: EVELYN CAMPBELL, M.V.O., 39 Gilston Road, S.W.10. Proposed by the Council.

TURNER: LAURENCE ARTHUR, F.S.A., 56 Doughty Street, W.C.1. Proposed by the Council.

It is desired to point out that the opinions of writers of articles and letters which appear in the R.I.B.A. JOURNAL must be taken as the individual opinions of their authors and not as representative expression of the Institute.

R.I.B.A. JOURNAL.

Dates of Publication.—1924: 8th, 22nd November; 6th, 20th December. 1925: 10th, 24th January; 7th, 21st February; 7th, 21st March; 4th, 25th April; 6th, 23rd May; 13th, 27th June; 18th July; 15th August; 19th September; 17th October.

